RouteFinder 100™

Single WAN Multi-Protocol Router

Model MTASR1-100

Single WAN Multi-Protocol Router

Owner's Manual

MultiTech® Systems

Owner's Manual

82052804 Revision E

RouteFinder100TM (Model No MTASR1-100)

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Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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RouteFinder 100™

Single WAN Multi-Protocol Router

Chapter 1 - Introduction and Description

MultiTech® Systems

1.1 Introduction

Welcome to Multi-Tech's new RouteFinder100™, model number MTASR1-100, an IP/IPX router for interconnecting LANs using switched or dedicated wide area telecommunicaitons links. The MTASR1-100 provides IP and IPX routing and Media Access Control (MAC) layer bridging for all other protocols over its WAN ports. It features a 10Base-T or AUI port for local LAN connection, Command Port for configuration, and an RS232/V.35 port for asynchronous or synchronous remote WAN connection using standard point-to-point protocol (PPP). The configurable WAN port operates with a compatible communication device operating up to 115K bps for async and T1 for sync speeds. These devices include asynchronous and synchronous modems, ISDN terminal adapters and DDS, Switched 56, Fractional T1 and T1 DSUs. System management is provided through the command port using bundled Windows® software which provides easy-to-use configuration menus.

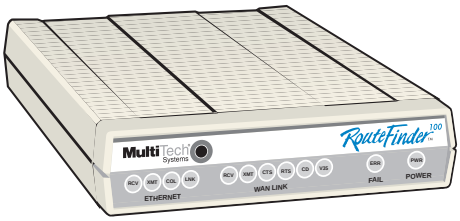


Figure 1-1. RouteFinder100

1.2 About This Manual

This manual describes the RouteFinder100 and tells you how to install and configure the unit. The information contained in each chapter is as follows:

Chapter 1 - Introduction and Description

Chapter 1 describes the RouteFinder100. A network overview describes the network architecture, what is in a packet, and network addressing. Two typical applications of a RouteFinder100 are provided. A list of relevant specifications is provided at the end of the chapter.

Chapter 2 - Front and Back Panel Descriptions

Chapter 2 describes the front panel indicators and back panel connectors. The front panel contains three groups of indicators that provide status of the LAN connection, link activity, and general status of the RouteFinder100. The back panel provides the cable connections to the EtherNet LAN, to a PC for configuration, and to an external WAN device.

Chapter 3 - Installation

This chapter provides information on unpacking and cabling your RouteFinder100. The installation procedure describes each cable connection starting with connecting the power cord, command port, LAN and finally the WAN. Finally, a procedure for changing the link interface from RS232 to V.35.

Chapter 4 - Software Loading and Configuration

Chapter 4 details the software loading and configuration of the RouteFinder100 for IP, IPX, or Spanning Tree Protocol with Simple Network Management Protocol (SNMP) for network management. The physical WAN port is configured for synchronous or asynchronous communication. Virtual WAN ports may be configured in frame relay for the WAN communications. The RouteFinder100 software diskettes are Windows® based. Each field within a dialog box that is alterable is described. Two worksheets are provided for you to fill in your network numbers for future reference.

Chapter 5 - RouteFinder^{100} Software

Chapter 5 describes the RouteFinder^{100} software package designed for the Windows® environment. The RouteFinder^{100} Program Group has seven icons that allow for configuration, download default setup, download firmware update, local port setup, WAN device configuation, remote user data base, and SNMP Manager from the program manager. Each field within a dialog box is explained in detail and when fields relate to each other, that relationship is explained.

Chapter 6 - Configuration Examples

This chapter provides configuration examples for the RouteFinder^{100} set up with either a dial-up or lease-line Basic Rate Interface (BRI) ISDN service using Terminal Adapters. The configuration examples start with the IP protocol using a Mounds View operation as the host LAN which is connected to the Minneapolis LAN over a ISDN switched service. The configuration procedures set up the Mounds View LAN first and then set up the Minneapolis LAN using an IP protocol and an external terminal adapter. The next pair of configuration examples uses IPX protocol followed by bridging.

The final section in this chapter provides examples of how the RouteFinder's are configured using frame relay as the communications medium.

Chapter 7 - Remote Configuration

This chapter provides procedures for changing the configuration of a remote RouteFinder^{100}. Remote configuration allows you to change the configuration of a unit by simply connecting two modems between the two RouteFinder^{100}s and remotely controlling the unit.

Chapter 8 - Router Management

Chapter 8 describes the Simple Network Management Protocol (SNMP) used to manage the RouteFinder network and typical Telnet Client applications (i.e., dial out, remote router configuration, remote WAN device configuration, and a remote user data base). Descriptions of the functions and features of the SNMP are provided in this chapter.

Chapter 9 - Dial Out Client Software

This chapter provides two methods for a user on a Novell network to dial out using the WAN port in the RouteFinder^{100}. The two provide either a software solution or a hardware solution for dialing out of the network. The software solution is used in a Windows and DOS application and the hardware solution is used in DOS application that requires a physical comm port locally installed on the PC.

Chapter 10 - Service, Warranty and Tech Support

Chapter 10 provides instructions on getting service for your RouteFinder^{100} at the factory, a statement of the limited warranty, information about our user bulletin board service, and space for recording information about your RouteFinder^{100} prior to calling Multi-Tech's Technical Support.

1.3 Network Overview

Network architecture defines how computer equipment and other devices are linked together to form a communications system that allows users to share information and resources. There are proprietary network architectures and open architectures like the Open Systems Interconnection (OSI) model defined by the International Organization for Standardization (ISO). The OSI model defines a layered model for an open systems environment in which a process running in one computer communicates with a similar process on another computer if they implement the same OSI layer communications protocol. The OSI protocol stack shown in Figure 1-2 is commonly used as a reference. During a communications session, processes running in each layer on each computer communicate with one another. The bottom layer defines the actual physical components such as connectors and cable and the electrical transmission of data bits between systems. The layers immediately above define data packaging and addressing methods. Still further up are methods for keeping communication sessions alive. Finally, the uppermost layers describe how applications use the underlying communication systems to interact with applications on other systems.

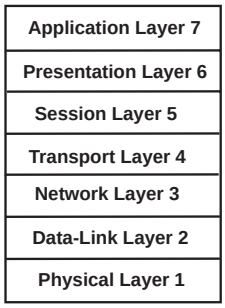


Figure 1-2. OSI Protocol Stack

Protocols are loaded into a computer as software drivers. Each layer of the protocol stack defines a specific set of functions. An application at the uppermost layer interacts with the layer below when it needs to send information to another system on the network. The request is packaged in one layer and passed down to the next layer, which adds information related to functions handled at that layer, creating a new packet within a packet. This package is then passed down to the next layer and the process continues. Each layer adds information to the message packet and this information is read by the corresponding layer in the receiving system's protocol stack. In this way, each protocol layer communicates with its corresponding protocol layer to facilitate communication.

The physical layer defines the physical characteristics of the interface, such as mechanical components and connectors, electrical aspects such as voltage levels representing binary values, and functional aspects such as setting up, maintaining, and taking down the physical link. Well known physical layer interfaces for data communication include RS-232 and RS-449, the successor to RS-232.

The data-link layer defines the rules for sending and receiving information across the physical connection between two systems. This layer encodes and frames data for transmission, in addition to providing error detection and control. Because the data-link layer can provide error control, higher layers may not need to handle such services. However, when reliable media is used, there is a perfomance advantage by not handling error control in this layer, but in higher layers.

The Network layer defines protocols for opening and maintaining a path on the network between systems. It is concerned with data transmission and switching procedures, and hides such procedures from upper layers. The network layer can look at packet addresses to determine routing methods. If a packet is addressed to a workstation on the local network, it is sent directly there. If it's addressed to a network on another segment, the packet is sent to a routing device, which forwards it on the network. Some commom protocols occupying the network layer are Internet Protocol (IP), X.25, Novell's Internetwork Packet Exchange (IPX), Banyan's VINES Internet Protocol (VIP).

The transport layer prodvides a high level of control for moving information between systems, including more sophisticated error handling, prioritization, and security features. It provides quality service and accurate delivery by providing connection-oriented services between two end systems. The transport layer controls the sequence of packets, regulates traffic flow, and recognizes duplicate packets. It assigns packetized information which is a tracking number that is checked at the destination. If data is missing from the packet, the transport layer at the receiving end arranges with the transport layer of the sending system to have packets retransmitted. This layer ensures that all data is received and in the proper order.

The session layer corrdinates the exhange of information between systems by using conversational techniques, or dialogues. Dialogues are not always required, but some applications may require a way of knowing where to restart the transmission of data if a connection is temporarily lost, or may require a periodic dialog to indicate the end of one data set and the start of a new one.

Presentation layer protocols are part of the operating system and the application the user runs on a workstation. Information is formatted for display or printing in this layer. Codes within the data, such as tabs or special graphics sequences, are interpreted. Data encryption and translation of other character sets are also handled in this layer.

Applications access the underlying network services using defined procedures in this layer. The application layer is used to define a range of applications that handle file transfers, terminal sessions, and message exchanges. Data starts at the application and presentation layers, where a user works with a network application, such as an electronic mail program. Requests for services are passed through the presentation layer to the session layer which begins the process of packetizing the information. A connection-oriented communication session may be opended between the two systems to provide reliable transmissions. Once the session is established, protocol layers begin exchanging information as appropriate.

1.3.1 Packet

A packet is a package of data that is exchanged between devices over a data communications link. Data exchanged between devices may include messages and commands, control codes for managing the session, and data. Information is placed in packets by various communications subsystems of the transmitting system, then framed into a serial bit-stream and sent across the communications link. One of the main reasons for packetizing and framing information is that errors on the communication link only affect a small, discernible part of the transmission, which is easily retransmitted.

The process starts at the application layer. An application in one computer has some information to send to another computer. The information is sent down through the protocol stack, across the wire, and up through the protocol stack of the other computer. This information takes the fom of a protocol data unit (PDU). As the PDU moves through the layers of the sending computer, each layer attaches specific information to the PDU that is relevant to the protocols in that layer. This attached information is destined for the peer layer in the receiving computer. For example, the transport layer in the sending computer adds a sequence number to the PDU. This sequence number is read by the transport layer in the receiving computer to resequence the packets.

The communication protocol defines the packet structure and the networking system in use and defines the frame structure for bit-stream transmission. Each protocol layer attaches information destined for its peer layer in the other computer. When the PDU reaches the physical layer, it is transmitted as a stream of bits. On copper wire, the bit-streams take the form of voltage level changes that represent binary ones and zeros. The data-link layer places the PDU in one or more frames and uses a media access method (such as CSMA/CD or token) to gain access to the transmission media. The PDU might be subdivided into a number of separately addressed frames. The frame format is defined by the network in use. For example, Ehternet defines frames that can hold up to 1,500 bytes of packet data.

In general, a packet is a collection of information that contains data (payload) and headers (pilot). Headers include the source and destination address as well as control information to handle errors and keep packets flowing properly. Each packet is a separate block of information that can have a different destination address, and in some cases, different sizes. A typical packet holds 512 bytes of information, so it takes many packets to transfer a large file over a network.

As packets traverse a network, the addressing information contained in them is used by bridges and routers to direct packets to their destination, or keep them off of networks where they don't belong. Routers direct packets along a specific path that has been predetermined as the best route to the packets' destination. Routers use algorithms to determine efficient paths in conjunction with other routers on the network. Administrators can also manually configure routers, based on the cost or speed of routes. Information can be transmitted to another system using either connection-oriented or connectionless methods. A connectionless session is more efficient for short, bursty transmissions since a session setup is not required, but the end system may need to perform more work to resequence packets that arrive out of order and check for lost packets.

1.3.2 Network Address

Every node on a network has an assigned address that other nodes use when communicating with it. For Ethernet and token ring network network adapters, unique addresses are assigned at the factory. ARCNET networks have user-definable addresses. For example, the address of an Ethernet and token ring network adapter consists of a 6-byte address, half of which is a special number identifying the board's manufacturer. The last half of the address is a unique number for the board assigned at the factory. This strategy virtually guarantees that no two Ethernet or token ring network interface cards will ever have the same address and prevents conflicts.

When separate networks are connected into an internetwork, a new addressing scheme is required. On interconnected NewWare networks, each network segment has its own address, which is used for routing purposes and differentiate each segment from the others.

In TCP/IP networks such as the Internet, every node has a numeric address that identifies both a network and a local host or node on the network. This addess is written as four numbers separated by dots, for example 200.2.9.1. The assignment of addresses is arbitrary within a company or organization, but if the company plans to connect with the Internet, it is important to obtain registered addresses from an outside agency to conform with international addressing standards. Applications running in computers also have addresses that other applications, either local or remote, use to communicate with the application. On TCP/IP networks, a socket is a combination of an Internet address plus an application address.

Internet Protocol (IP)

Internet Protocol is a connectionless communication protocol that by itself provides a datagram service. Datagrams are self-contained packets of information that are forwarded by routers based on their address and the routing table information contained in the routers. Datagrams can be addressed to a single node or to multiple nodes. There is no flow control, acknowledgment of receipt, error checking, and sequencing. Datagrams may traverse different paths to the destination and thus arrive out of sequence. The receiving station is responsible for resequencing and determining if packets are lost. IP handles congestion by simple discarding packets. Resequencing and error handling are taken care of by upper layer protocols.

IP works on a number of local and wide area networks. When IP runs in the LAN environment on an Ethernet network, for example, the data field in the Ethernet frame holds the IP packet and a specific field in the frame indicates that IP information is enclosed. IP uses an addressing scheme that works independently of the network addressing scheme. For example, every Ethernet adapter has a factory-assigned address for each node.

IP Addressing

Every node on an IP network requires a 4-byte numeric address that identifies both a network and a local host or node on the network. A typical IP network is shown if Figure 1-3. This address is written as four numbers separated by dots, for example, 200.2.9.1. In most cases, the network administrator sets up these addresses when installing a device.

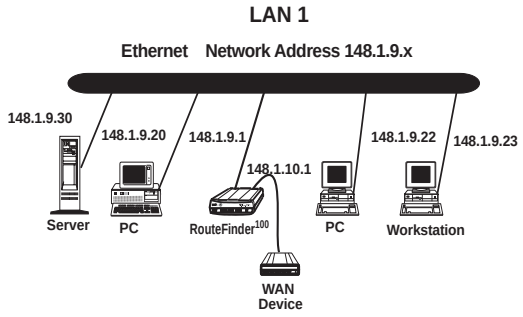


Figure 1-3. Typical IP Network

The assignment of addresses is arbitrary within a company or organization, but if a company plans to connect with the Internet anytime in the near future, a registered addresses should be obtained from the Defense Data Network (DDN) Network Information Center (NIC), which is managed by Network Solutions in Chantilly, Virginia. With the growing popularity of the Internet, it is recommended that all organizations obtain registered addresses to avoid address conflicts in the future.

There are three classes of Internet addresses; Class A, B and C. Class A networks use the first byte of the IP address for the network number and the remiaing three bytes for the host number. The first byte may have any value from one to 127.

Class B networks use the first two bytes of the IP address for the network number and the last two bytes for the host number. The first byte must have a value from 128 to 191.

Class C networks use the first three bytes of the IP address for the network number and the last byte for the host number. This scheme provides for a very large number of different networks, each with up to 255 addressable devices. The first byte must have a value from 192 to 223.

The part of the IP address that refers to the network is called the network address. A network mask is the bit pattern which yields the network address in a Boolean AND operation with the IP address. For example, in Class C networks, network addresses take the form X.X.X.0. The network mask for Class C networks is 255.255.255.0. In all of the IP addresses on a given network, the network address will remain the same while the host portion will be different for each host or workstation.

1.4 Typical Applications

Two typical applications are described; the first application describes a RouteFinder[100] connected to an IP LAN using two modems or DSU for the WAN communications, the second application describes a RouteFinder[100] connected to an IP LAN and frame relay being used for the WAN communications. Using frame relay changes the RouteFinder[100] into a single port router with many virtual WAN ports. When frame relay is configured on the RouteFinder[100], only one physical WAN port is used. This WAN port can have up to 16 virtual WANs running off from it.

1.4.1 Typical IP Application

A typical application for the RouteFinder[100] is connecting two local area networks (LANs) together using either a modem or DSU for the wide area network (WAN) communications. In this typical application the LAN protocol is IP. As shown in Figure 1-4, LAN 1 is assigned a network address of 200.2.10.x and LAN 2 is assigned a network address of 200.3.12.x. The Ethernet port of the RouteFinder[100] for LAN 1 has an address of 200.2.10.1 and the WAN 1 address is 200.2.11.1. The LAN 2 network address is 200.3.12.x with the RouteFinder[100] Ethernet port address of 200.3.12.1 and a WAN 1 address of 200.2.11.2.

Figure 1-4. Typical Application

To connect the RouteFinder[100] to LAN 1, the Ethernet port needs to be connected to LAN 1 using either a twisted pair RJ-45 telephone cable or a 10Base5 (thicknet) cable connected to the Ethernet Attachment Unit Interface (AUI) connector on the back panel of the RouteFinder[100].

To connect the RouteFinder[100] to a WAN device, the type of WAN device has to be considered; is it a modem device or a DSU device and is the device synchronous or asynchronous. Also, is the communicaitons link going to be a dial-up, lease line or DDS.

To configure the RouteFinder[100], a PC needs to be running Windows®. With Windows running on the PC, insert the RouteFinder[100] Software diskette into the disk drive and at the run command dialog box, start the loading of the RouteFinder[100] software. Follow the normal software loading process and when the dialog box for the IP Protocol Default Setup is displayed, click on the OK button to continue loading. The RouteFinder[100] IP Protocol Default Setup dialog box is shown in Figure 1-5.

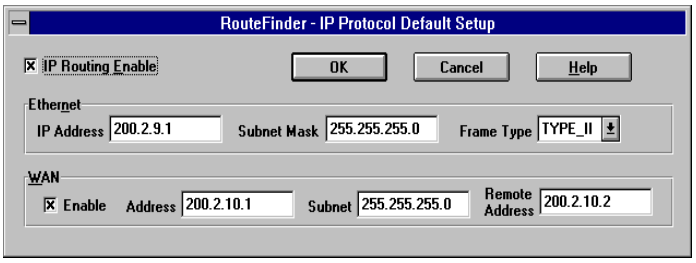


Figure 1-5. IP Protocol Default Setup Dialog Box

All fields in the IP Protocol Default Setup dialog box have default values in them. You need to change the values to your specific network.

In the typical application presented in Figure 1-5, you need to establish the address for the Ethernet port and the WAN port. When you have entered the IP address, subnet mask, and frame type for your network, you can click on the OK button and move on to the next dialog box.

The next dialog box is the WAN Ports Default Setup dialog box (Figure 1-6). This is where you need to consider how your wide area network is going to be used. First of all, is it a modem, DSU, ISDN type of device and does the device operate in synchronous or asynchronous mode. If the communications device is synchronous, all the other fields within the dialog box for that port are disabled (i.e., they turn to a gray print and you can not select those fields). If the device is asynchronous, then you have to decide if it is a dial-up or a direct connection. If it is a dial-up device, then the Modem Type field and the Dial Number field are activated. You need to pick your modem type frome the Modem Type drop down list and if your RouteFinder^{100} is providing the dialing, you need to enter the telephone number at the other end of the communication network.

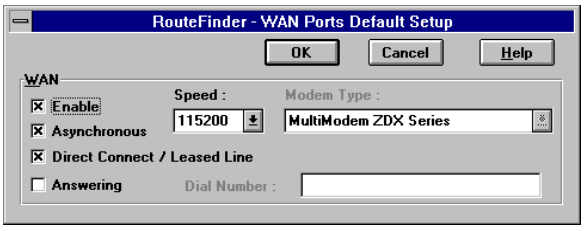


Figure 1-6. WAN Ports Default Setup Dialog Box

So now, you can click on the OK button and the setup utility is ready to download your new configuration into the RouteFinder^{100}. The new configuration is downloaded into the RouteFinder^{100} and the RouteFinder^{100} is automatically rebooted. The Windows software returns to the Program Manager screen and when the FAIL light on the RouteFinder^{100} goes off, it is ready to transfer data between the two networks.

1.4.2 Typical Frame Relay Application

A typical application of a frame relay network with a RouteFinder[100] at the Mounds View site with two virtual circuits communicating through a public or private frame relay network to two remote sites (one at River Falls and the second at Minneapolis). One of the virtual circuits through the frame relay network ties the Mounds View LAN to LAN 2 at the River Falls site. A second virtual circuit connects the Mounds View LAN to LAN 3 in Minneapolis.

In a frame relay network, a single physical connection can support multiple logical connections. Three primary elements apply in a frame relay network that need to be defined at the time the network is subscribed for; the access line, port connection, and the Permanent Virtual Circuits (PVCs) assigned. The access line is the physical line connection from the local site to the frame relay network. This access line is terminated at the user's site by a DCE which in this example is a fractional T1 DSU at the Mounds View site and 64K DSUs at the remote sites. The port connection is the access point into the frame relay network via the local phone company's frame relay switch. The logical connections are defined by PVCs which are logical connections between two nodes (or port connections) on the frame relay network. Mulitple PVCs for the Mounds View site allow multiple logical connections to be carried over one physical line.

Figure 1-7. Frame Relay Example

To setup a RouteFinder[100] for frame relay services, the Ethernet port of the LAN has to be configured for the router, virtual WAN setup for each frame relay network, frame relay services subscribed for (requested from your service provider), the access device (DSU) connected to the RouteFinder[100] and the port of the frame relay network.

1.4.3 Subscription

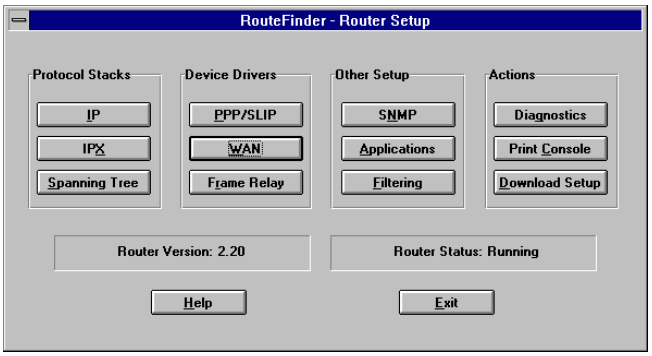
Subscription of frame relay services involve communicating with your local network service provider to have the physical line connected, the port connection defined, and assigning the Data Link Connection Identifiers (DLCIs) which are numbers between 16 and 1007 that identify the virtual connection (PVC) at the local interface between the RouteFinder[100] and the phone company's switch. When each DLCI is assigned, your local service provider will define the permanent virtual circuit (PVC) that is the virtual path to the destination. Each PVC is assigned an average guaranteed throughput rate called committed information rate (CIR) and may have an excess burst rate (Be). The sum of the CIR and Be for all PVCs can not exceed the port connection capacity (bandwidth). Finally during subscription, the management type is defined by the local frame relay service provider. The management type is a mechanism for communicating the status of all the PVCs on the port connection. Three types of management are supported by the RouteFinder[100]: local management interface (LMI), Annex D, and Annex A.

1.4.4 Configuration

Before any configuration process can begin, a pc has to be connected to the command port of the RouteFinder[100] and the RouteFinder[100] software loaded. Configuration of a RouteFinder[100] can be done during the loading of the software or from the Main menu once the software is installed. Also, any sequence can be used to configure the RouteFinder[100], but all the categories have to be defined; the LAN address and its associated logical WAN address for each DLCI, the DLCI mapped to the protocol stack and its WAN address choosen, and the CIR and Be defined for each DLCI. For our typical application, the Main Menu is used. To configure a typical site, lets say that the LAN protocol is IP, the host site (Mounds View) has two logical WANs which are mapped to DLCIs 50 and 51. DLCI 50 provides a virtual path through the frame relay network to DLCI 52 at the River Falls site. DLCI 51 provides a virtual path to DLCI 53 at the Minneapolis site.

To begin configuration, the site with multiple logical paths should be configured first; so that, the logical WANs are tied to the Ethernet port, the remote WAN is configured to the same network as the local logical WAN, and no LAN has the same address. In our typical example, the Mounds View site should then be configured first and then either the River Falls site or the Minneapolis site can be configured. This will ensure that the logical WANs at the River Falls and Minneapolis sites are in the same networks as their respective logical WANs at the Mounds View site and that the Ethernet port addesses at the River Falls and Minneapolis sites do not conflict with any addess at the Mounds View site.

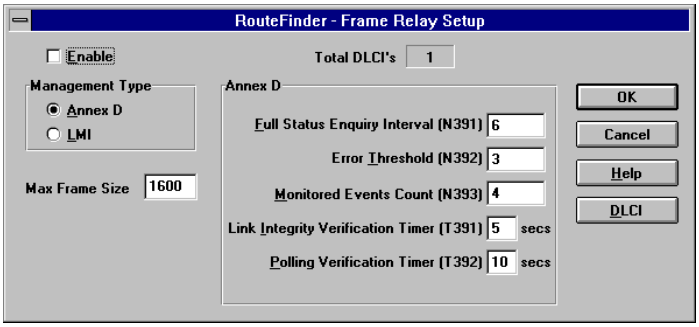
To begin our typical configuation, a pc is connected to the command port of the RouteFinder[100], the RouteFinder[100] software loaded. From the RouteFinder[100] program group, double click on the Router Configuration icon which after reading the RouteFinder[100] configuration, displays the Main menu.



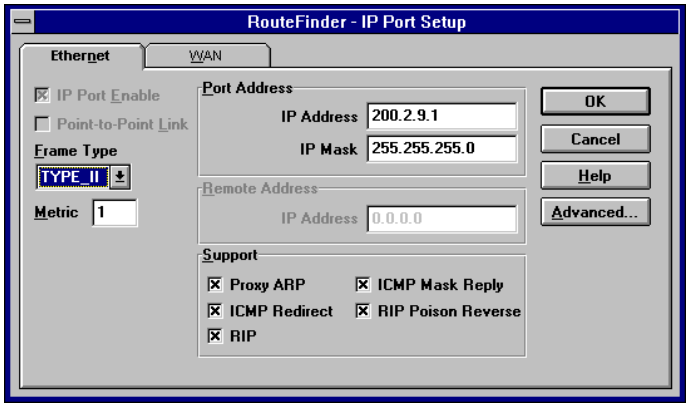
The Main Menu is the central point from where we branch into the protocol stacks, and the device drivers that define frame relay. Now back to the Mounds View site configuration, the protocol stack was determined to be IP. In the RouteFinder[100] software defaults, the IP and IPX stacks have been enabled. So if our LAN protocol is IP and no other protocol is going to be used, we can click on the IPX button, and from the IPX Virtual Port Setup dialog box, click on the Advanced button to disable the protocol in the IPX General Setup dialog box by clicking on the IPX Routing Enable check box. Then click on the OK buttons twice to return to the Main Menu. This disables the IPX protocol.

The other protocol stack is Spanning Tree bridging which is disabled as a default configuration. So nothing has to be done to the Spanning Tree stack.

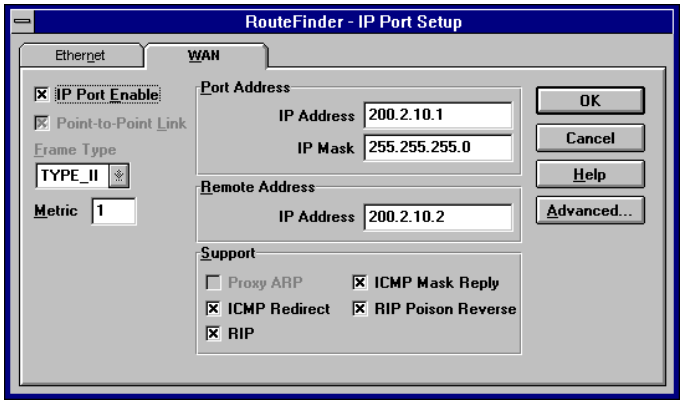
From the Main Menu, click on the Frame Relay button and the Frame Relay Setup dialog box is displayed.



In this dialog box click on the Enable check box to enable frame relay. At this point we don't have to be concerned with anything else in this dialog box. We will be coming back through here again when we map the DLCI(s) to the protocol stack. For now, we can click on the OK button to return to the Main menu. At the Main menu, click on the IP button to display the IP Port Setup dialog box.



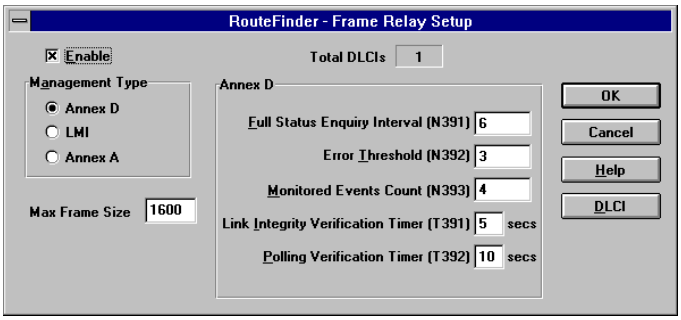
This dialog box displays the default address for the Ethernet port (200.2.9.1). For the Mounds View site in our typical application we choose IP address of 200.2.8.1 for the Ethernet port. To change the default Ethernet Port Address, you would have to click on the Port IP Address box and back space through the default address and enter 200.2.8.1. The same process would have to occurr for the River Falls LAN (LAN 2) with an IP address of 200.2.11.1 and the Minneapolis LAN (LAN 3) with an IP address of 200.2.12.1. After the correct port address is entered, you need to click on the WAN tab to display the WAN Port Setup dialog box.



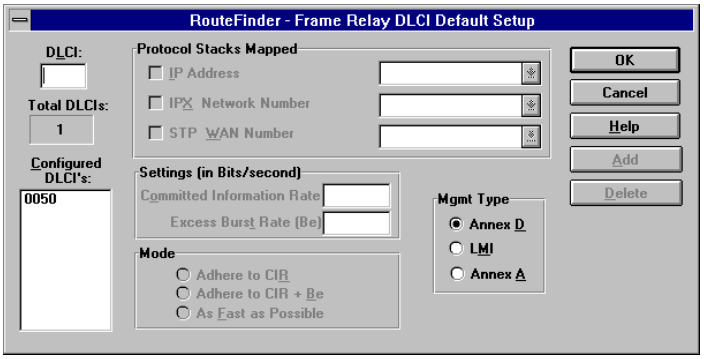
The WAN IP Port Setup dialog box displays the default Port Address and Remote Address for WAN 1, a list of Logical WANs in the lower left part of the dialog box, and a series of buttons along the right side of the dialog box. The Port Address and Remote Address displayed in these groups are associated with logical WAN 1. To add a second logical WAN, click on the Port IP Address field, and update the IP address for your second logical WAN. Click on the Remote Address IP address and update the remote address. Ensure that the local and remote IP addresses are within the same network. These logical WAN addresses will appear in the Frame Relay dialog box when you assign your DLCI numbers.

In our typical application, the Mounds View site has two logical WANs with a Port Address of 200.2.9.1 for logical WAN 1 with a Remote Address of 200.2.9.2 and a Port Address of 200.2.10.1 for logical WAN 2 with a Remote Address of 200.2.10.2. The River Falls site must have a Port Address of 200.2.9.2 for its logical WAN 1 with a Remote Address of 200.2.9.1. The logical WAN addresses have to be on the same network in order for them to communicate through the frame relay network. The same process holds true for logical WAN 2 and the Minneapolis site. So, choosing the correct port and remote address and the corresponding logical WAN is very important in order to communicate through a frame relay network.

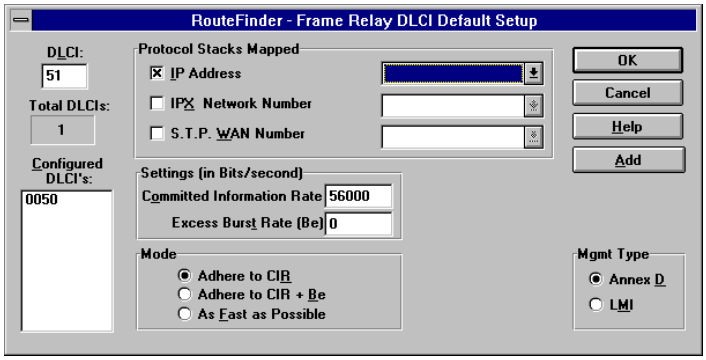
After the Port and Remote addresses for your logical WAN(s) have been established, now you can assign your DLCI number(s), map the DLCI to a protocol stack and your logical WAN port address for your site. During subscribtion of your frame relay service, a DLCI or two DLCIs in the case of the Mounds View site have been established by your local service provider. Now, to assign the DLCI to your site and then map it to a protocol stack, you have to click on the OK button in the IP Port Setup dialog box for the WAN to return to the Main menu. Then click on the Frame Relay button in the Main menu, the Frame Relay Setup dialog box is then displayed.



In the Frame Relay Setup dialog box a Management Type group is displayed just below the Enable check box. During subscription of the frame relay services, the management type was defined by your local service provider. In our typical application lets assume that the management type is Annex D which is the default in this dialog box. In the center of this dialog box are the default parameters for Annex D which should be sufficient at this time. If the Management Type required by your local service provider was LMI (Local Management Interface), or Annex A, then you could click on the respective option button to change the management type. The default parameters for management type would be displayed in the middle of the dialog box. Now to assign DLCIs, click on the DLCI button in this dialog box and the Frame Relay DLCI dialog box is displayed.



From this dialog box you can enter any DLCI number between 16 and 1007, map each DLCI to a protocol stack, and assign the CIR, Be, and mode for each DLCI. For our typical application, the Mounds View site was assigned two DLCIs, the River Falls site and the Minneapolis site one DLCI per site. For the Mounds View site with two DLCIs, DLCI 50 is tied to logical WAN 1 and DLCI 51 is tied to logical WAN 2. To assign the first DLCI (DLCI 50) which is the default DLCI, click on the configured DLCI's 0050, which is the DLCI for the first logical WAN for the Moudns View site. To map DLCI 50 to a protocol stack, click on the IP Address check box and then the down arrow for the IP protocol stack becomes active. Click on the IP protocol stack down arrow and the logical WAN IP addresses appear in the drop down menu. To map DLCI 50 to logical WAN 1, click on address 200.2.9.1. This maps that address to DLCI 50.



The next frame relay parameter to consider is the Committed Information Rate (CIR) and the Excess Burst Rate (Be). The total CIR and Be for all the DLCIs at a particular site can not exceed the port capacity. During subscription, the local service provider established that each virtual circuit could run at 64,000 bit-per-second, so for the Mounds View site the port capacity is 128K bandwidth. This allows up to 64K for each DLCI which could translate into a CIR of 64000 and a Be of zero or maybe a better combination would be a CIR of 56000 and a Be 9000. This last combination of 56K and 9K may provide less congestion on the frame relay network.

The final frame relay parameter is Mode. The Mode depends on how you set up the CIR and Be. If you have a value in both the CIR and Be fields, then the best mode would be Adhere to CIR + Be or you could choose the As Fast as Possible option.

To add DLCI 50, click on the Add button. To map DLCI 51 to its protocol stack, click on the DLCI numeric dialog box and enter 51. Then click on the IP Address check box. When the WAN IP addresses appear in the drop down menu, you will notice that the address for logical WAN 1 no longer appears. Click on the logical WAN 2 address 200.2.10.1. Then set the CIR and Be values for logical WAN 2. Set the Mode and click on the Add button to map DLCI 51. Now you can click on the OK button and return to the Main menu. Click on the Download Setup button and the setup utility is ready to download the frame relay configuation to the RouteFinder^{100}. The RouteFinder^{100} is automatically rebooted. The Windows software returns to the Program Manager screen and when the FAIL light on the RouteFinder^{100} goes off, it is ready to transfer data over the frame relay network.

To configure the River Falls and Minneapolis sites, you follow the same process as we just went thru only you only have to consider one logical WAN and DLCI for each site.

The following listing ties the Mounds View LAN to its logical WANs, maps the logical WANs to their DLCI, provides the virtual path through the frame relay network to their respective remote site. Following the Mounds View example, space is provided for you to fill in your host site address, logical WAN address, DLCI, and if you have your PVC number from your local service provider. Continuing on is the remote site information for this virtual path. A point to remember here is that the logical WAN has to be in the same network in order for this to work and that no LAN can have the same address.

Mounds View Site **River Falls Site**

LAN 1 IP Address	Logical WAN 1 Address	DLCI	Local PVC	Remote PVC	DLCI	WAN 1 Address	LAN 2 IP Address
200.2.8.1	200.2.9.1	50	16	26	52	200.2.9.2	200.2.11.1

Your Host Site **Its Remote Site**

LAN 1 Address	Logical WAN 1 Address	DLCI	Local PVC	Remote PVC	DLCI	WAN 1 Address	LAN 2 Address
_____	_____	___	____	____	___	_____	_____

Mounds View Site **Minneapolis Site**

LAN 1 IP Address	Logical WAN 2 Address	DLCI	Local PVC	Remote PVC	DLCI	WAN 1 Address	LAN 3 IP Address
Same IP	200.2.10.1	51	17	27	53	200.2.10.2	200.2.12.1

Your Host Site **Its Remote Site**

LAN 1 Address	Logical WAN 2 Address	DLCI	Local PVC	Remote PVC	DLCI	WAN 1 Address	LAN 3 Address
Same Addr	_____	___	____	____	___	_____	_____

1.5 Specifications

The RouteFinder[100] conforms to the following specifications.

- Routing Protocols - IP and IPX and bridging all others
- EtherNet LAN Interface - 10Base-T (twisted pair) or 10Base2 (ThinNet) BNC
- WAN Interface - 3 async or sync Links (RS232C/V.35)
- Command Port - 19.2K bps Asynchronous
- One 4megabyte DRAM (1 meg by 36 byte at 70
  Caution: SIMM speed and size can not be mixed.
- 1MB of Flash memory

EtherNet Port

- One Ethernet Interface - 10Base-T (twisted pair) RJ45 (ThinNet) BNC connector

Command Port

- Single 19.2K bps asynchronous Command Port using a short RJ45 to DB25 cable with a female connector

WAN Link

- 115.2K bps asynchronous WAN link or T1 (1.544Mbps) sync link using DB25 male connector. Optional ITU-T V.35 interface using a V.35 adapter cable.

Electrical/Physical

- Voltage - 115 VAC (Standard), 240 Volts AC (Optional)
- Frequency - 47 to 63 Hz
- Power Consumption - 10 Watts
- Dimensions -1.625" high x 6" wide x 9" deep
  .63cm high x 2.34cm wide x 3.51cm deep
- Weight - 2 pounds (.92 kg)

Requirement

- PC with Windows 3.1x, one serial comm port to connect to the Command Port of the RouteFinder[100]

RouteFinder 100™

Single WAN Multi-Protocol Router

Chapter 2 - Front and Back Panel Descriptions

MultiTech® Systems

2.1 Introduction

This chapter describes the front panel LEDs and back panel connectors. The front panel contains LEDs for the EtherNet (LAN), WAN Link, and the self test fail and power. The back panel connectors are the Ethernet 10BASE-T and BNC (10Base2) connections for the LAN, the WAN Link connection (RS232/ V.35) for the WAN communications device, and the command port connection for configuration of the RouteFinder[100].

2.2 Front Panel

The front panel contains three groups of LEDs that provide the status of the LAN connection, link activity, and general status of the RouteFinder[100]. The EtherNet LEDs display the activity of the LAN in whether the RouteFinder[100] is connected to the LAN, transmitting or receiving packets, and if a collision is in progress. The WAN LEDs display the status of the link (i.e., ready to transmit or receive serial data and if an external communications device with a V.35 interface is connected to the RouteFinder[100]. The last group of LEDs indicate whether the self test passed or failed and if the power On/Off switch on the back of the RouteFinder[100] is turned On.

Figure 2-1. Front Panel

ETHERNET

RCV Receive indicator blinks when packets are being received from the local area network.
XMT Transmit indicator blinks when packets are being transmitted to the local area network.
COL Collision indicator lights when a collision is in progress, that is, when two nodes are transmitting packets at the same time.
LNK Link indicator lights indicating that the RouteFinder[100] is connected to the local area network.

WAN Link

RCV Receive indicator blinks when the link is receiving data.
XMT Transmit indicator blinks when the link is transmitting data.
CTS Clear To Send indicator lights when the link is ready to transmit data.
RTS Request to Send indicator lights then the link is ready to receive data.
CD Carrier Detect indicator lights when the RouteFinder[100] detects a carrier signal.
V.35 The V35 indicator lights when the link is configured for a V.35 interface. That is, the shunt for the link is in the V.35 position.

FAIL Fail indicator lights when a self test fails to complete as expected.
POWER The power indicator lights when the On/Off Switch is in the ON position.

2.3 Back Panel

The cable connections for the RouteFinder[100] are made at the back panel. Three groups of cables are used on the RouteFinder[100], the Command Port, WAN link, and the EtherNet. The cable connections are shown in Figure 2-2 and defined in the following groups.

Figure 2-2. Back Panel

RS232/V.35 Connector

The RS232/V.35 connector is used to connect the RouteFinder100 a WAN device. The WAN device connection is to an asynchronous or synchronous communications device such as a modem, DSU, or ISDN terminal adapter. This connection can be either RS232C or V.35. If the connection is V.35, then the shunt must be moved from the default RS232 position to the V.35 position. This connector is a DB25 male connector.

10Base T Connector

The 10Base-T connector is used to connect the RouteFinder[100] to a LAN using unshielded twisted cable. This connector is an RJ45 jack.

10Base 2 Connector

The 10Base 2 connector is used to connect the RouteFinder[100] to a LAN using thin coax cable.

Command Port Connector

The Command Port connector is used to configure the RouteFinder[100] using a PC with a serial port and running Windows® software. The Command Port connector is an RJ-45 jack and a short adapter cable is provided to convert to a standard serial port DB25 female connector.

Power Connector

The Power connector is used to connect the external power supply to the RouteFinder[100]. The Power connector is a 6-pin circular DIN connector. A separate power cord is connected to the power supply and the live AC grounded outlet.

ON/OFF Switch

The power switch provbides DC power to the RouterFinder when placed in the ON position and removes power when placed in the OFF position.

2.4 Shunts

The shunts are on the back of the printed circuit board. The shunts are shown in Figure 2-3.

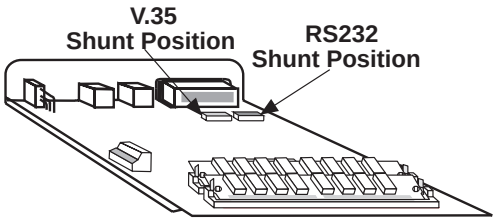


Figure 2-3. Shunts

The RouteFinder has a shunt for the RS232 and the V.35 links. The shunts are shown in Figure 2-3. The RS232 shunt position, the default position, is shown in the figure and the V.35 position is identified. To change the position of a shunt, refer to the V.35 Shunt procedure in Chapter 3.

RouteFinder 100™

Single WAN Multi-Protocol Router

Chapter 3 - Installation

MultiTech® Systems

3.1 Introduction

This chapter is organized in the way you will unpack and cable your RouteFinder[100]. The unpacking section describes the contents of the shipping box and shows how the RouteFinder[100] is packaged. The installation procedure describes each cable connection and shows where that cable is connected to the RouteFinder[100].

3.2 Unpacking

The shipping box contains the RouteFinder[100], external power supply, a plastic bag containing cables, your owner's manual, and the software diskette. Inspect the contents for signs of any shipping damage. If damage is observed, do not power up the unit, contact Multi-Tech's Technical Support for advice (refer to Chapter 9). If no damage is observed, place the RouteFinder[100] in its final location and perform the Installation Procedure in Table 3-1.

Save the shipping box in case a return shipment is necessary.

Figure 3-1. Unpacking

3.3 Installation

The installation procedure describes how to connect the RouteFinder[100] to an Ethernet LAN, a terminal or PC for configuration and a WAN.

Installation Procedure

Step Procedure

1 Connect the external power supply to the RouteFinder[100] and a live AC outlet. The POWER connector on the back panel of the RouteFinder[100] is a 6-pin circular DIN connector.

Figure 3-2. Power Connection

2 Connect a PC running Windows® to the COMMAND PORT connector on the back panel of the RouteFinder[100]. Use the short RJ45 to DB25 cable provided with the RouteFinder[100] to connect to the PC.

Figure 3-3. PC to Command Port

3 Configure the RouteFinder[100] for your application using the procedures in Chapter 4.

4 Connect a network cable to either the ETHERNET 10BASE-T (RJ45) or coax cable to the BNC connector on the back panel of the RouteFinder[100]. Connect the other end of the cable to the network.

Figure 3-4. Network Connection

5 Connect an RS232 or V.35 interface cable to the RS232/V.35 connector on the back panel of the RouteFinder[100]. Connect the other end of the cable to the RS232 or V.35 connector on the external link device (modem, DSU, or ISDN terminal adapter).

V.35 requires a special cable that has a 25-pin female connector on one end and a 34-pin winchester male connector on the other end. Refer to Appendix A for cable details.

Figure 3-5. Link Connection

The RouteFinder[100] installation is complete, proceed to Chapter 4 - Software Loading and Configuration.

3.4 V.35 Shunt Procedure

Table 3-2 provides the procedure for moving the link shunt when the RouteFinder[100] is being connected to an external composite link device with a V.35 interface.

V.35 Shunt Procedure

Step	Procedure
1	Ensure that the external power supply is disconnected from the RouteFinder[100].
2	Turn the RouteFinder[100] up-side-down and remove the cabinet mounting screw in the cabinet.

Figure 3-6. Cabinet Mounting Screw

3 Turn the RouteFinder[100] right-side-up and tilt the back down slightly and the base will slide out of the cabinet.

4 Place the unit with the LEDs facing you.

5 Pry the shunt out of the RS232 position for the link being changed and insert it in the V.35 position for that link.

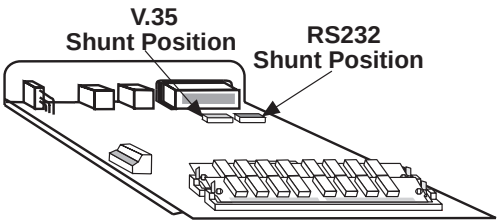


Figure 3-7. V.35 Shunt

6 Slide the base back into the cabinet with the LEDs going toward the front and the back side grounding tabs pressing against the side of the cabinet.

7 Turn the RouteFinder^{100} up-side-down and replace the cabinet mounting screw in the cabinet.

Figure 3-8. Replacing Cabinet Mounting Screw

8 Turn the RouteFinder^{100} right-side-up and return to Table 3-1 to connect the cables.

RouteFinder 100™

Single WAN Multi-Protocol Router

Chapter 4 - Software Loading and Configuration

MultiTech® Systems

4.1 Introduction

This chapter covers procedures for loading the software and configuring your RouteFinder[100]. There are several paths the software loading process can take depending on the protocol that you are using, whether the WAN is a real port or one or many virtual ports used in frame relay. The first path that you will see is using IPX as the protocol and the WAN device providing the access to public telephone service. The second path is again using IPX, but changing the WAN device to virtual WANs. The third and fourth paths just change the protocol and follow the same process with the WAN device and virtual WANs.

You will not have to go through all the procedures for any application. The software loading is organized so that everybody uses the common procedures at the beginning. Then you break off depending on your protocol. You break off again depending on how your WAN is used. Finally you come back to some common procedures that every body has to use.

4.2 Loading Software

Common Procedure

1 Turn on your PC connected to the Command Port of your RouteFinder[100] and run Windows®.

2 Create a backup copy of your RouteFinder[100] software diskettes before you install the software. Store the master diskettes in a safe place and install the RouteFinder[100] software using the backup copy.

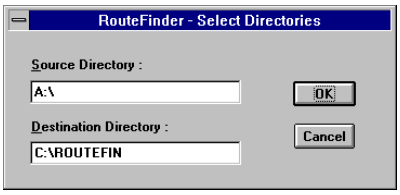
3 Inset the backup disk, labeled RouteFinder[100] Disk 1, into the floppy drive.

4 Click on the File Menu in your Program Manager.

5 Click on Run. The Run dialog box is displayed.

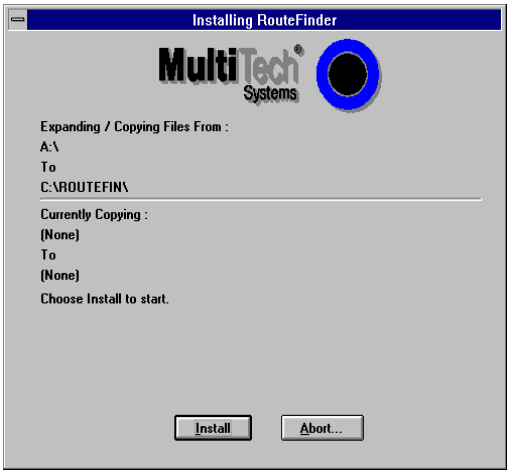
6 Type **a:\install** or **b:\install** (depending on the location of your floppy disk drive) in the Command Line field, and then click on **OK**.

7 The RouteFinder[100] Setup - Select Directories dialog box is displayed.



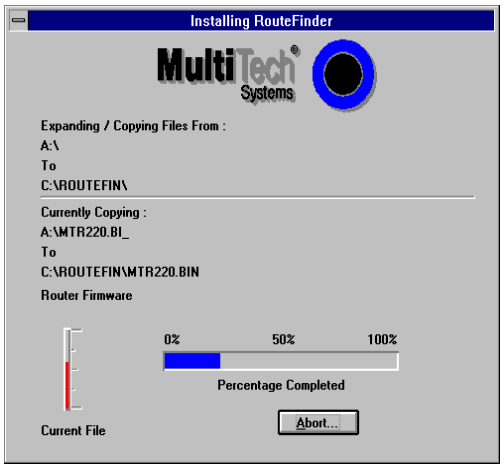
If you are installing from Drive A: and your Destination Directory is the default directory, click on O.K. to continue.

8 The Installing RouteFinder[100] dialog box is displayed.

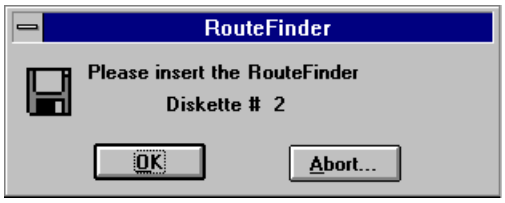


Click on **Install** to continue installation, at any time you may click on **Abort** if you wish to cancel the install.

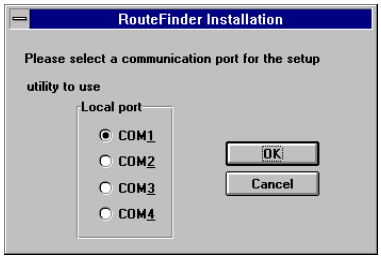
9 The Expanding/Copying Files From: dialog box is displayed. You can view the progress of the installation from this dialog box. You can click on **Abort** at any time to cancel the install.



10 When the Percentage Completed reaches approximately 50%, the following display appears. Remove Disk #1 and insert Disk #2. Click on OK to continue.



11 The RouteFinder[100] Setup Installation dialog box asks "Please select a communication port for the setup utility to use" dialog box is displayed. In other words, which COM port on your PC is connected to the Command Port of the RouteFinder[100].

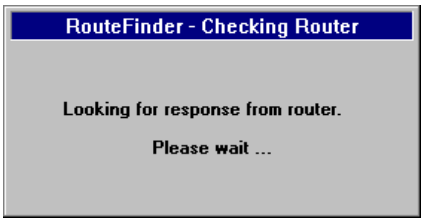


Select the **COM** port (**COM1,COM2,COM3, or COM4**) for the setup utility. The default port is COM1. Click on **OK** when you are satisfied with your selection.

12 When the setup installation is successful, a system message is displayed stating "RouteFinder[100] Setup Installation Successful. Do you want to setup default parameters?"

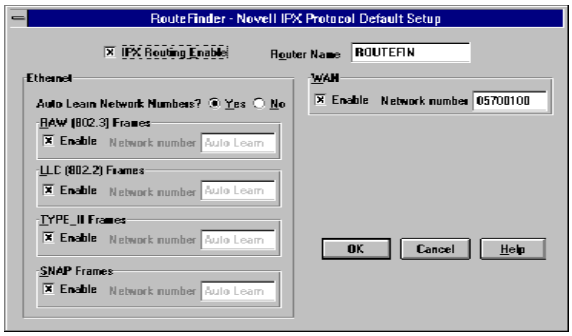
13 Turn on power to the RouteFinder[100] and wait for the FAIL LED to go off before you click on the **Yes** button. Click on **Yes** to set up the default parameters. If you click on **No**, the installation is complete.

14 If you select Yes, the "Looking for response from router" dialog box is displayed only for a brief time.



IPX Procedure

15 A series of four default dialog boxes, RouteFinder^{100} - Novell IPX Protocol Default Setup, RouteFinder^{100} - IP Protocol Default Setup, RouteFinder^{100} - WAN Default Setup, and RouteFinder^{100} - Frame Relay DLCI Default Setup will be displayed.



If your network protocol is **IPX,** continue with the following steps. If frame relay is being used as the WAN and is being connected to an IPX network, continue with the following steps.

If your network protocol is **IP**, click on **IPX Routing Enable** check box to disable IPX, then click on the **OK** button, and proceed to step 27. If frame realy is being used as the WAN and is being connected to an IP network, proceed to step 27.

16 You can use the default Router Name or you can assign a new Router Name in this field. If you assign a new Router Name, it must be printable ASCII string of a maximum of 47 characters. The router name is used by the RouteFinder^{100} to advertise its service in the IPX inter-network.

17 You can enable Auto Learn Network Numbers from the default **Yes** or you can manually assign the network numbers by clicking on **No** in the Auto Learn Network Numbers field.

If no file server is connected to the Ehternet segment, then this field should be **No** (recommended).

If you enable Auto Learn (**Yes**), the RouteFinder^{100} will learn the IPX network numbers from the file server.

If you select **No** for Auto Learn, you can manually assign network numbers. When manually assigning network numbers, you must make sure they match the network numbers assigned for the file server.

18 Enter WAN network number for the active WAN Port by clicking on the Network Number box and back spacing through the default number and entering your new WAN Number. Also, the WAN network number must be the same network as the RouteFinder^{100} on the other end of the link.

The WAN network numbers have to be assigned by the Network Administrator and must be unique throughout the entire inter-network.

Note: The WAN ports do not have the capability of learning the network numbers unlike the LAN ports (i.e., the WAN port does not have a file server).

19 Record the network numbers assigned by the network file server for each of the four frame types (Raw (802.3), LLC (802.2), EthernetII (Type II), SNAP) for LAN 1 in the space provided in Figure 4-1.

Figure 4-1. IPX Protocol Worksheet

20 Assign a Router Name to the RouteFinder on LAN 1. Write the name in the IPX Worksheet. This name must be unique to the entire inter-network.

21 Assign a WAN Network number of the WAN connection on the RouteFinder in LAN 1. Write the number in the IPX Worksheet.

22 Record the network numbers assigned by the network file server for each of the four frame types (Raw (802.3), LLC (802.2), EthernetII (Type II), SNAP) for LAN 2 in the IPX Worksheet.

23 Assign a Router Name to the RouteFinder on LAN 2. Write the name in the IPX Worksheet This name must be unique to the entire inter-network.

24 Assign a WAN Network number of the WAN connection on the RouteFinder in LAN 2. This number must be in the same network as the WAN number on LAN 1. Write the number in the IPX Worksheet.

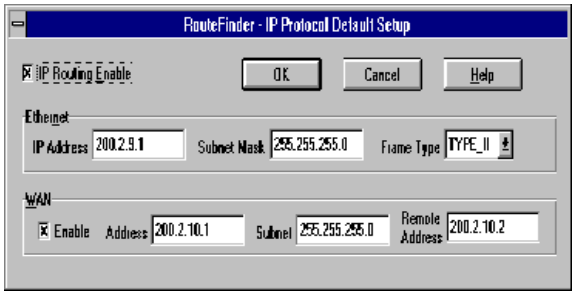
25 Click on the **WAN** field default network number and change the default number to the number you have assigned for the WAN port on your LAN.

Click on **OK** when you are satisfied with your selections.

26 If frame relay is being used as the WAN service and is being connected to an IPX network, proceed to step 42.

IP Procedure

27 If you clicked **OK** from the IPX Protocol Default Setup dialog box (step 15), the IP Protocol Default Setup dialog box is displayed.



28 To change the IP parameters do not click OK, proceed to the next step. Clicking on the **OK** button advances to the WAN Port Default Setup dialog box. The WAN Port Default Setup starts at step 36.

29 Assign an acceptable unique IP address to the EtherNet port for the RouteFinder[100] on LAN 1. Write the IP address in the space provided in Figure 4-2 for LAN 1 RouteFinder EtherNet IP Address.

30 Assign an acceptable unique IP address to the WAN port for the RouteFinder on LAN 1. Write the IP address in the space provided on the IP Protocol Worksheet.

Figure 4-2. IP Protocol Worksheet

31 Assign an acceptable unique IP address to the EtherNet port for the RouteFinder[100] on LAN 2. Write the IP address in the space provided in Figure 4-2 for LAN 2 RouteFinder EtherNet IP Address.

32 Assign an acceptable unique IP address to the WAN port for the RouteFinder on LAN 2. Write the IP address in the space provided on the IP Protocol Worksheet.

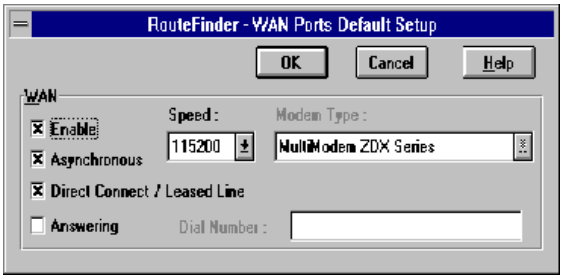
33 Change the default **IP Address**, **Subnet Mask**, and **Frame Type**, to the values you have assigned to your LAN port.

34 Change the default **Address, Subnet Mask,** and **Remote Address** for the WAN to the values you have assigned to your LAN.

35 Click on **OK** when you are satisfied with your selections.

WAN Procedure

36 If you clicked on the **OK** button from the IP Protocol Default Setup dialog box, the WAN Port Default Setup dialog box is displayed. The WAN Port is enabled in this dialog box.



37 If the WAN port is being connected to an asynchronous device and is being used for Answering, click on the **Answering** check box. Then proceed to steps 39 and 40 to set the speed and modem type.

If the WAN port is being connected to an asynchronous device and is being used to dial, click on the **Direct Connect/Leased Line** and the **Dial Number** text box becomes active. Enter the phone number of the RouteFinder[100] at the other end of the communications network. Then proceed to steps 39 and 40 to set the speed and modem type.

38 If the WAN device is a synchronous device, click on the **Asynchronous** check box. The RouteFinder[100] assumes that the synchronous device will provide the clocking signal for the data on the WAN port. You must make sure the synchronous device is set up for this; refer to the user documentation for the synchronous device to set the clocking. Proceed to step 41.

39 If the WAN device is an asynchronous device, click on the **speed** arrow and the drop down list box displays the baud rate for the WAN device. Refer to the user documentation for the WAN device baud rate.

40 If the WAN device is an asynchronous device, click on the **Modem Type** arrow and the drop down list box displays the supported modems. Highlight your modem type.

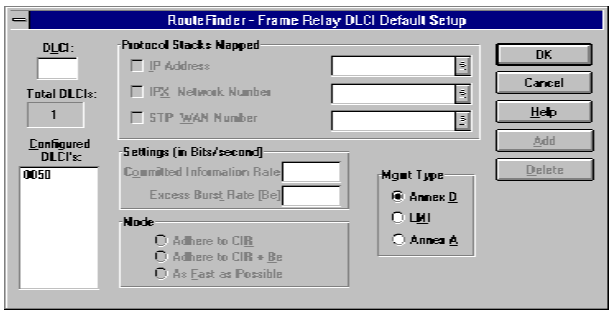
41 Click on **OK** when you are satisfied with your selections.

If your WAN port is connected to an asynchronous device, proceed to step 52.

If your WAN port is connected to a synchronous device, proceed to step 42 to determine if frame relay is going to be used.

Frame Relay Procedure

42 The Frame Relay DLCI Default Setup dialog box is displayed. If frame relay is being used as the WAN, proceed to the next step. If frame relay is not being used, click on the **OK** button and proceed to step 52.

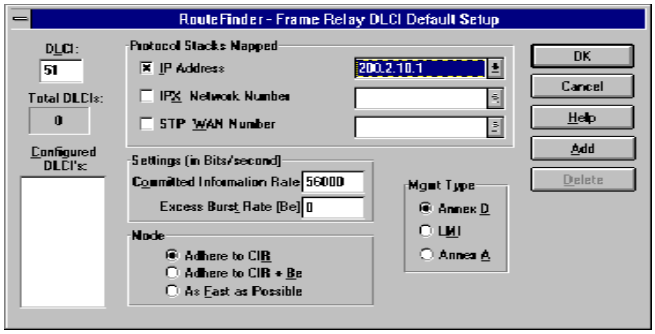


The DLCI has to be mapped to the logical WAN 1 address of the protocol stack for the LAN that is connected to the RouteFinder[100]. The remote logical WAN 1 address for this DLCI path has to be in the same network.

43 If the default DLCI 50 is being mapped to a logical WAN, click on the Configured DLCI's 0050 and map the default DLCI to a protocol stack.

Click on the **DLCI** numeric dialog box and enter a DLCI number that was provided by your service provider at subscription time. **Do Not** hit the **ENTER** key at this time. If you hit the ENTER key, installation continues without adding your DLCI information. You can recover from this by configuring frame relay from the Main Menu after installation. Refer to Chapter 5 for a description of the frame relay configuration, if necessary.

44 To map this DLCI to a protocol stack, click on the **protocol stack** check box for the protocol of your LAN. Then click on the down arrow for that protocol and the drop down dialog box presents the WAN addresses. Choose the logical WAN address by clicking on the address.



45 Click on the **Committed Information Rate** numeric box in the **Settings** (in Bits/second) category and enter the CIR value provided by your service provider at subscription time for this DLCI.

46 Click on the **Excess Burst Rate (Be)** numeric box in the **Settings** (in Bits/second) category and enter the Be value provided by your service provider at subscription time for this DLCI.

47 Click on **As Fast as Possible** check box in the **Mode** category. Multi-Tech recommends this as the initial setting and if you experience loss of data choose one of the other two settings.

48 Click on the **Mgnt Type** group and choose the management type that is supported by your Frame Relay network. The management type is supplied by your service provider at subscription time.

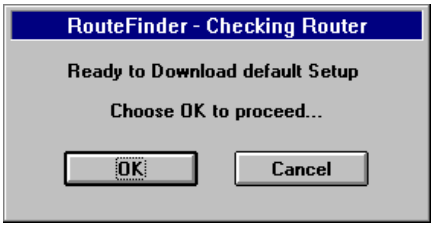
49 Click on the **Add** button to save the parameters for this DLCI.

50 Repeat steps 43 through 49 for each new DLCI.

51 Click on the **OK** button when you have entered all your DLCIs.

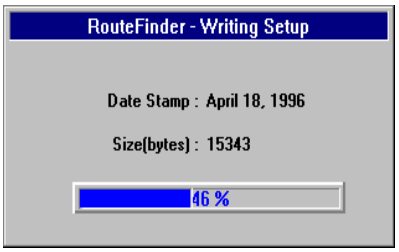
Common Procedure

52 The Checking Router dialog box is displayed.

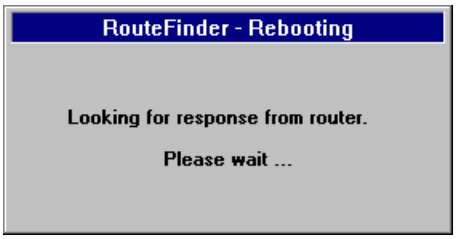


The Setup utility is "Ready to Download default setup Choose OK to proceed." Click on **OK** to proceed.

53 Writing setup dialog box is displayed as the setup configuration is written to the RouteFinder^{100}.



54 After the setup is written to the RouteFinder^{100}, the unit is rebooted.



55 Check to ensure that the **FAIL** LED on the RouteFinder^{100} is Off after the download is complete.

56 You are returned to your Progam Manager where the RouteFinder^{100} Program Group and Program Item (the Windows icons) have been created.

Your RouteFinder^{100} is fully operational at this time.

RouteFinder 100™

Single WAN Multi-Protocol Router

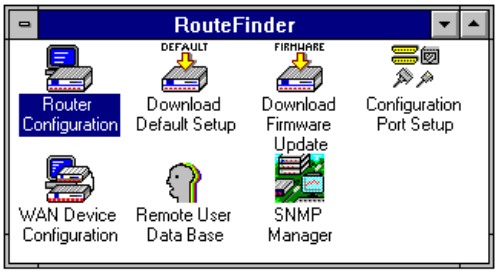
Chapter 5 - RouteFinder Software

MultiTech® Systems

5.1 Introduction

This chapter describes the RouteFinder software package which is designed for the Microsoft® Windows® environment. The RouteFinder Program Group has seven icons that allow Router Configuration, Download Default Setup, Download Firmware Update, Local Port Setup, WAN Device Configuration, Remote User Data Base, or SNMP Manager from the Program Manager by double clicking on one of the icons.

The Router Configuration icon allows you to configure your protocol stack, device driver parameters, or basic hardware testing and running the console terminal. The Download Default Setup icon allows the default configuration to be transferred to the RouteFinder. The Download Firmware Update icon allows new firmware changes to be transferred to the RouteFinder. The Configuration Port Setup icon establishes the parameters for which the console pc communicates with the RouteFinder. The WAN Device Configuration icon enables the console pc to configure an external WAN device. The Remote User Data Base icon lets you set up a data base of your remote users. The SNMP (Simple Network Management Protocol) Manager icon provides the network management functions.



5.2 Router Configuration

To view or change your RouteFinder configuration, double click on the Router Configuration icon.

You may also start Router Configuration from the File Manager by selecting the mtrouter directory and double clicking on the *roucon.exe* program in the file list. Local port setup may also be started from File Manager by selecting *psetup.exe* from the file list.

You may also run Router Configuration from either the Program Manager or the File Manager by clicking on the Run command in the File Menu, then typing: C:*mtrouter\roucon.exe* in the Command Line field. Local port setup may also be run from the Command Line by typing: C:*mtrouter\psetup.exe*.

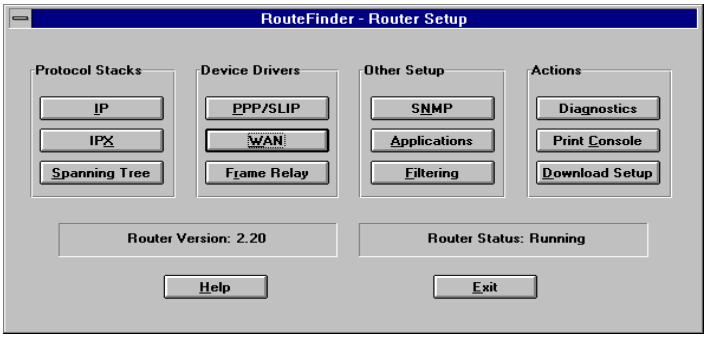
5.2.1 Setup Menu

The RouteFinder setup menu organizes your configuration process into a couple of main configurations. The Protocol Stacks configuration defines the network address or name, and protocol specific parameters depending on the network protocol. Also, transpasrent bridging or bridging using the Spanning Tree Algorithum is set up through the protocol stack group.

The Device Drivers group defines the output of the RouteFinder by enabling either point to point protocol (PPP) or serial line IP protocol (SLIP), a wide area network (WAN) device, or frame relay.

The other Setup group allows for network managemment, applications such as TFTP for transferring files between two nodes, telnet for terminal emulation at a remote workstation, and filtering of data packets for getting through the link.

The following sections describe each button in the RouteFinder setup menu and each field and button in each dialog box.



Certain options are enabled depending on the state of the target. If no RouteFinder (target) is found, click on the Configuration Port Setup icon in the RouteFinder program group, specify the right local port parameters and retry running this application. You can also connect to the target through a dialup modem.

RouteFinder setup also has a console terminal for displaying various debugging messages output from the target. You can control the display of these messages using this application. Normally you should turn off the display of all messages for better performance of the router.

5.2.2 Protocol Stacks

IP

This button selects the Internet Protocol setup.

IPX

This button selects the Novell Internet Packet Exchange (IPX) protocol setup.

Spanning Tree (Bridging Protocol)

This button allows you to select either transparent bridging or bridging using the Spanning Tree Algorithm setup as specified in the IEEE 802.1d standard.

5.2.3 Device Drivers

PPP

This button selects the Point-to-Point Protocol (PPP) setup.

Frame Relay

This button selects the Frame Relay setup.

WAN

This button selects the Wide Area Network (WAN) link setup.

5.2.4 Other Setup

SNMP

This button selects the Simple Network Management Protocol (SNMP) setup.

Applications

This button selects the setup for the Telnet server, TFTP server, a World Wide Web server, or the Async Gateway server built into the RouteFinder. A dumb terminal can be connected to the command port for configuration and management of the RouteFinder.

Filtering

This button selects the filtering of various protocol packets.

5.2.5 Actions

Diagnostics

A limited set of hardware diagnostics are available through this button. It is also possible to test the communication link.

If the RouteFinder is running, it will have to be rebooted before diagnostics can be performed. (You will be queried before doing so.)

Print Console

Displays the print messages received from the target device.

Download Setup

You can update the RouteFinder setup on the target. This will bring the RouteFinder down for updating the setup. Then, reboot the RouteFinder.

Router Version

The current version number of the RouteFinder firmware is displayed in this field.

Router Status

The current status of the router is displayed in this box, if setup was able to communicate with the target. When the Setup program comes up and no "Dial String" is specified, it will automatically check for the presence of a target. If a dial string is present, you will need to be explicit. Refer to the Owner's Manual of the WAN device for dialing information.

Help

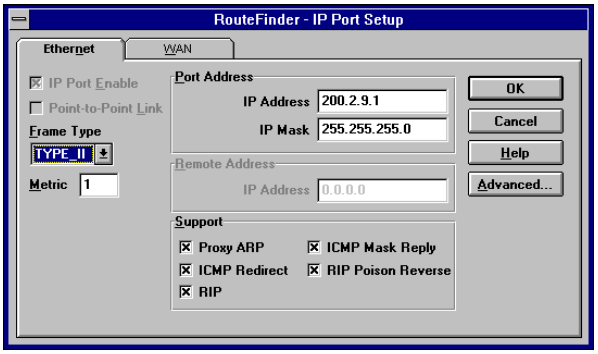
A thorough On-line Help sytem is provided with abbreviated information on the dialog boxes and the buttons within a dialog box.

Exit

This will end your RouteFinder session and return you to the Program Manager.

5.2.6 IP (Internet Protocol) Port Setup

The IP Port Setup dialog box allows setup of IP parameters for the Ethernet and WAN ports. Some of the parameters are not setable if they do not make sense for the particular type of port. Those parameters are grayed out. The following parameters can be set.



IP Port Enable = [Enable l Disable]

Enables IP routing on the specified port. This field is turned off when the Ethernet port is selected. When a WAN port is selected, this field is active. If you enable IP Routing in the General Setup dialog box and disable IP Routing in this dialog box, all IP packets received or to be transmitted on this port will be discarded (i.e., even if you have bridging enabled, the packets will not get across).

IP Port Point-to-Point Link = [enabled | disabled]

Enables the specified port to be attached to a point-to-point (typically WAN) link. See IP Port ARP for related information. This field is editable for the Ethernet and WAN ports. It is shown to you only for information purposes.

IP Port Frame Type = [TYPE_II | SNAP]

Defines the MAC layer frame encapsulation to be used for the IP transmissions from the specified port.

Network Type	***Supported Frame Type***
Ethernet (DIX / Type II)	*TYPE_II*
IEEE 802.3 CSMA / CD	SNAP
Synchronous WAN	TYPE_II

Since the WAN port supports only TYPE II, this field is not editable in such cases.

IP Port Metric = [decimal value]

Defines the IP metric associated with the specified port. The metric value 16 is defined as infinity (unreachable).

Recommended value: 1

IP Port Address = [dotted decimal IP address],[dotted decimal IP mask]

Defines the IP address and IP subnet mask for the specified port. The IP address uniquely specifies a node on an IP internetwork. Each IP address is a combination of a network number and a host number or ID. IP address masks are used to specify the network or subnet portion of the IP address. IP addresses and masks are 32-bit values. These are usually provided in what is known as the dotted decimal notation. In this notation, each 8-bit portion of the address is given a decimal quantity separated by a dot. For example, 192.2.10.1. RouteFinder expects all IP addresses to be provided in dotted decimal notation. Among IP addresses, address 0.0.0.0 and 127.?.?.? cannot be specified as they are special case addresses not used on the internetwork for addressing. For Class A, B, and C addresses, you will usually specify address masks of 255.0.0.0, 255.255.0.0 and 255.255.255.0 respectively unless other subnets have been set up.

IP Port Remote Address = [dotted decimal IP address]

Defines the IP address for the destination end of a point to point link. This parameter is only necessary if the specified WAN port has been enabled for operation under point to point mode. This field has no meaning when the Ethernet port is selected. The Ethernet port is not a point-to-point link. See IP Port Point-to-Point Link.

IP Port Support Proxy ARP = [enabled | disabled]

Enables Proxy ARP services that are provided to the specified port.

Some nodes (like routers) in an IP network can usually behave as proxies for distant (reachable only through routers or bridges) nodes replying to ARP requests on behalf of the distant nodes. The RouteFinder can behave in this manner and provide a Proxy ARP service. The idea is to reduce link traffic on slow links through which the distant node can be reached.

This field is turned off for WAN ports.

IP Port Support ICMP Redirect = [enabled | disabled]

Defines if the specified port is permitted to issue an ICMP Redirect message to the source IP address. Internet Control Message Protocol (ICMP) is used in IP networks as an internal protocol for nodes to exchange control and diagnostic information. Applications normally will not use ICMP for any purpose.

The most prominent cause of this message is the delivery of a datagram to a router not on the forwarding path to the destination address. This is often due to a wrong configuration of the IP client sending the datagram. The packet causing the ICMP Redirect message to be transmitted is forwarded to the appropriate router.

Recommended value: enabled

IP Port Support RIP = [enabled | disabled]

Enables IP RIP based routing on the specified port. RIP based routing should normally be enabled. This can be disabled in case you are using WAN links in Dial-On-Demand mode. In these links, disabling RIP will reduce traffic on the link as this will also disable periodic RIP broadcasts. RIP routing on the port will be automatically turned off when Dial-On-Demand is enabled in PPP port setup.

IP Routing Information Protocol (RIP) is a protocol used among routers to exchange routing table information. RIP is the most common protocol used in both IP and IPX networks. RIP is also used internally by client workstations in IPX networks to obtain routes (shortest or otherwise) to any distant network.

Routing Tables are tables maintained in each IP or IPX router that maintains information on how to reach known networks and the cost (or hop) of reaching the network. In other words, the routing table has information that tells which outgoing port a packet should be put on to reach the destination network addressed in the packet. Routers use some protocol (usually RIP) to broadcast their routing tables on the internetwork. Routers receiving such broadcasts, update their tables to build up a full picture of all networks on the internetwork of LANs.

The RouteFinder can be instructed to hangup a WAN connection if there is no data going across the network. Later, ON Demand, the link can be brought up automatically when data is available for the network.

When Dial-On-Demand is enabled, the RouteFinder will automatically:

1. Enable SPX spoofing
2. Enable IPX watchdog spoofing
3. Enable Novell Serialization packet filtering
4. Disable the IPX RIP table aging (sets the RIP age timer to zero)
5. Disables the IPX SAP table aging (sets the SAP age timer to zero)
6. Disables RIP based routing in IP. Now static routing or default routing will have to be used to route IP packets
7. Disables Spanning Tree Bridging

Disabling Dial-On-Demand resets the RIP and SAP aging timers to their default values. However, all other parameters are left as is. The user will have to specifically change them if desired. In other words, enabling and disabling Dial-On-Demand is not quite reversible.

IP Port Support ICMP Mask Reply = [enabled | disabled]

Enables support for nodes on the connected networks to learn their subnet masks.

Recommended value: enabled

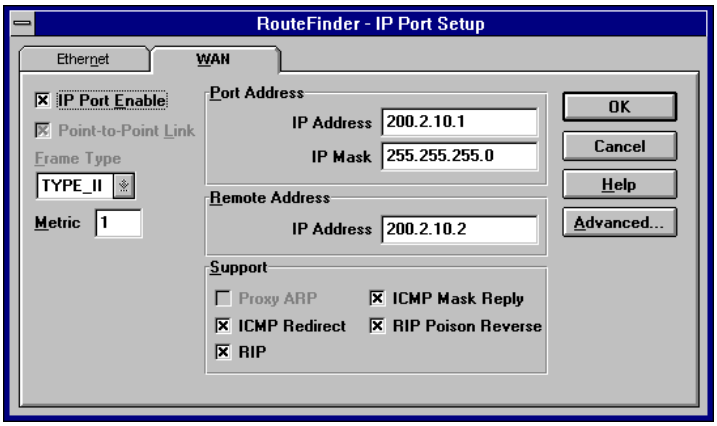
IP Port Support RIP Poisoned Reverse = [enabled | disabled]

Defines if Poisoned Reverse IP RIP messages are supported on the specified port. Generation and processing of poisoned routes (RIP entries with their respective metric set to 16,defined as infinity) is enabled/ disabled by this parameter. Poisoned reverse is a method used by IP RIP to improve the rate of convergence of the routing tables of interconnected IP routers. Routers supporting poisoned reverse that receive such IP RIPs ignore the entries set to 16 and thus prevent the propagation of unneccessary (and often incorrect when a topology change occurs) information which in turn accelerates the rate at which IP RIP will correctly map the current network topology.

Recommended Value: enabled

Add A New Network

If Frame Relay is enabled, then it is possiblle to add a new network. To add a new network, click on the WAN tab in IP Port Setup dialog box. The IP Port Setup dialog box changes to display the List of Logical WANs and the Number of Logical WANs, and three new buttons (Add, Delete, and Save Change).



Note: 16 networks it the maximum number of networks.

Delete a Network

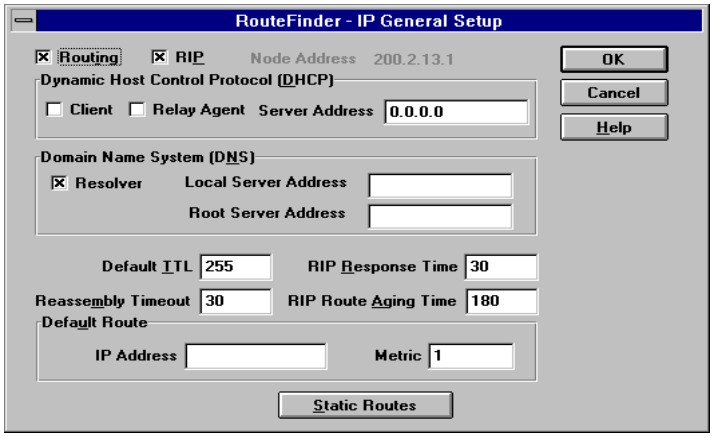
If Frame Relay is enabled, then it is possiblle to delete a new network. An existing network can be deleted by selecting it from the List of Logical WANs and clicking on the Delete button.

Save Change

The Save Change button is avilable only when Frame Relay is enabled and can be used to save changes made to parameters of a network. To change parameters of a network, select the network from the list of logical WANs and then change the parameters required and click on the Save Change button.

IP General Setup

This dialog box allows you to setup various configuration options for the IP routing protocol. The IP General Setup dialog box is displayed by clicking on the Advanced button in the IP Port Setup dialog box. These options apply to all ports on which routing takes place.



The following parameters can be set.

IP Routing = [enabled | disabled]

Check this item to enable IP routing. Normally this item is check. If you do not wish to have IP packets routed, then uncheck this item. If IP routing is disabled and bridging is enabled, IP packets are bridged, i.e., IP packets are transferred. If you do not want IP packets to get across at all, then you may enable this control and disable IP Routing in the IP Port Setup dialog box.

IP RIP= [enabled | disabled]

Enables IP RIP based routing. IP Routing Information Protocol (RIP) is a protocol used among routers to exchange routing table information. RIP is the most common protocol used in both IP and IPX networks. RIP is also used internally by client workstations in IPX networks to obtain routes (shortest or otherwise) to any distant network.

RIP based routing should normally be enabled. This can be disabled in case you are using WAN links in Dial-On-Demand mode. In these links, disabling RIP will reduce traffic on the link as this will also disable periodic RIP broadcasts. RIP routing on the port will be automatically turned off when Dial-On-Demand is enabled in PPP port setup.

Routing Tables are tables maintained in each IP or IPX router that maintains information on how to reach known networks and the cost (or hop) of reaching the network. In other words, the routing table has information that tells which outgoing port a packet should be put on to reach the destination network addressed in the packet. Routers use some protocol (usually RIP) to broadcast their routing tables on the internetwork. Routers receiving such broadcasts, update their tables to build up a full picture of all networks on the internetwork of LANs.

IP Node Address = [dotted decimal IP address]

End-station IP address assigned to the RouteFinder. This address is the same at the Ethernet port IP address and can not be edited.

IP DHCP Client = [enabled I disabled]

The Dynamic Host Configuration Protocol (DHCP) allows users to setup a WAN port as client-only. In such cases, a PPP client connected to this WAN port will be on the same IP network as the LAN port. This feature can save some extra IP addresses that otherwise would have been taken up by the WAN port. Enabling this option allows the RouteFinder to dynamically get an IP address for a PPP client coming up on one of its "Client-only" WAN port. When this option is enabled, there must be a DHCP server or DHCP relay agent on the connected LAN for the RouteFinder to acquire an appropriate IP address.

This option applies only to the Client-only WAN port.

IP DHCP Relay Agent = [enabled I disabled]

The RouteFinder is capable of relaying DHCP Packets across its port. In cases where these is no DHCP server located on the LAN segment of the RouteFinder, this option needs to be enabled. The RouteFinder will then relay the DHCP packets between clients on the directly connected networks and the server. Clients on a directly connected network are clients on the LAN and a PPP client calling-in on a client-only WAN port.

DHCP Server IP Address = [dotted decimal IP Address]

If an DHCP relay agent is enabled, the IP address of the DHCP server must be entered in this field.

DSN Resolver = [enabled I disabled]

The RouteFinder supports Domain Name System (DNS) for the terminal server application. This is a built-in telnet client which can connect a call coming in on a WAN port from a telnet host. When a user dials into the system to get connected to a telnet server, the RouteFinder will prompt for a telnet host address. The user can either type in the dotted decimal IP address or the domain name of the host.

Check this option if you are planning to use the DNS Resolver. If you disable this option, applications like terminal server will not support domain names.

DNS Local Server Address = [dotted decimal IP Address]

The IP address of the local DNS server is entered in this field.

DNS Root Server Address = [dotted decimal IP Address]

The IP address of the local DNS server is entered in this field. This is used only if the local DNS server doesn't respond.

IP Default TTL = [decimal value]

Defines the IP Time-To-Live parameter that sets the maximum number of hops a frame may travel before being dropped. This is used to limit errant frames such as those that may arise under circularly defined networks.

IP RIP Response Time = [decimal seconds]

Defines the time interval between periodic IP RIP broadcasts. Regular RIP broadcasts are required to keep the routing tables of all routers in the internetwork consistent. Increasing the frequency of these broadcasts may consume precious bandwidth that could have been used for transfer of other regular packets.

Recommended value: 30 seconds

IP Reassembly Timeout = [decimal seconds]

This value defines the amount of time the IP routing software will wait for all the fragments of an IP datagram to arrive before discarding the partially reassembled datagram.

Recommended value: 30 seconds

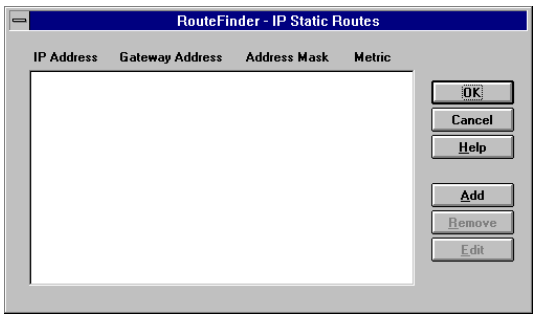
IP RIP Route Aging Time = [decimal seconds]

Defines the time interval that must expire before an unused route entry created by IP RIP is aged from the route table. The aging timer starts from the addition, reference, or change of an IP RIP based routed entry.

Recommended value: 180 seconds

IP Static Route = [target host IP address],[gateway IP address],[decimal metric]

Selecting the Static Routes button in the IP General Setup dialog box brings up this dialog box that lets you view, add, edit or delete static routes to an IP host or network within an internetwork. The target host and gateway IP address are specified in dotted decimal form. The gateway IP address is the IP address of the router that is the next hop toward the target host. The metric is the hop count to the target host. The address mask is the subnet mask of the targtet IP host.

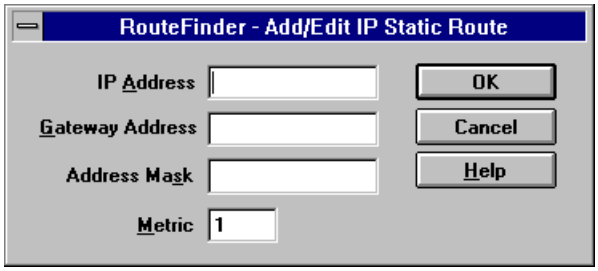


The RouteFinder administrator can define Static Routes to hosts or networks in an internetwork. Using these entries, the IP address of an immediate gateway to reach the specified host or network can be specified. There can be many static route specifications at the same time. Each entry is specified as a quadruple.

Destination IP address - Immediate Gateway Address - Address Mask - Metric

The static routes currently configured are displayed in the list Multiple entries can be selected for deletion. Individual entries can be selected for editing. Selecting the Add button brings up a dialog that lets you add items to the list.

To add a route, click on the Add button and the Add Static Host Route dialog box is displayed.



The IP Address field specifies the static route to the target host or network.

The Gateway Address field specifies the immediate gateway to which the RouteFinder can route all packets to the host or subnet.

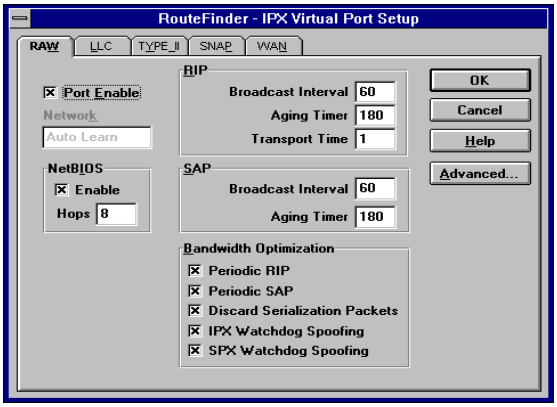
The Address Mask specifies the subnet mask of the target network.

The Metric field is the hop count to the target host or subnet. This can be 0 or 1.

5.2.7 IPX (Internet Packet Exchange) Virtual Port Setup

This dialog box allows you to setup configuration parameters for each virtual IPX port. This dialog box is displayed by clicking on the IPX button in the Router Setup dialog box. IPX is capable of handling different Ethernet frame types over the same physical link.

In IPX based networks using Ethernet, LAN segments can support the use of four different Ethernet frame formats. So nodes can use any of the four frame types in a single segment. To support these four frame types, the RouteFinder treats a single LAN port through which packets of four different frame types can be sent or received, as four ports. So each port is termed as a Virtual port that maps on to the same physical port.



IPX Port Enable = [enabled | disabled]

Enables routing of IPX packets on the specified virtual port. Disabling a virtual port disables all IPX routing activity on the particular virtual port (frame type such as RIP, SAP, forwarding, etc.).

IPX Network = [32 bit hex IPX network number]

Defines a network number for the segment connected to the virtual port. In case auto-learn is enabled (see IPX General Setup by selecting the Advanced button), you cannot set this field for LAN virtual ports.

IPX Netbios = [enabled | disabled]

Enables the transport of Novell encapsulated NetBIOS packets on the specified virtual IPX port. Refer to Novell documentation regarding NetBIOS operation over NetWare based LANs.

IPX Port Netbios Hops = [decimal hop count]

Defines the maximum distance, in hops, for the routing of Novell encapsulated NetBIOS frames on the specified virtual IPX port.

Recommended value: 08

IPX RIP Broadcast Interval = [decimal seconds]

Defines the time interval between periodic IPX RIP broadcasts transmitted from the specified virtual IPX port. Periodic RIP broadcasts are required so that all routers on the internetwork maintain consistent routing tables. Increasing the frequency of RIP broadcasts can consume too much bandwidth specially on low-speed WAN links.

Recommended value: 60 seconds

IPX Port RIP Aging Timer = [decimal seconds]

Defines the time interval used to age and delete IPX RIP based route entries for the specified virtual IPX port from the route table. The timer starts when a route entry is created by IPX RIP, updated by IPX RIP, or referenced for forwarding.

Recommended value: 180 seconds

IPX Port RIP Transport Time = [decimal time in units of 50 milliseconds]

defines the time required, in units of 50 milliseconds, to forward frames from the specified virtual IPX port. This value is indicative of the speed of the link. The transport time is used to calculate the best cost path.

Recommended value: LAN based ports - 01

WAN based ports - 20

IPX Port SAP Broadcast Interval = [decimal seconds]

Defines the time interval between periodic IPX SAP broadcasts. Regular SAP broadcasts are required to consistently advertise the presence of servers all over the internetwork. Increasing the frequency of broadcasts can consume useful bandwith, specially on low-speed WAN links.

Service Advertisement Protocol (SAP) is used in IPX based networks to allow servers (application servers, file servers, print servers, communication servers, etc.) to advertise their presence on the internetwork. Routers use these advertisements to build up tables listing the servers so that they can then advertise these servers on the local segments and provide routers to the server. Client workstations can request the router for a list of these servers.

IPX Port SAP Age Timer = [decimal seconds]

Defines the time interval used to age and delete IPX SAP based route entries for the specified IPX port from the route table. The timer starts when a route entry is created by IPX SAP, updated by IPX SAP, or referenced for forwarding.

Recommended value: 180 seconds

IPX Port Periodic RIP = [enabled l disabled]

Checking this item turns on periodic RIP broadcasts. Normally periodic RIP broadcasts should be enabled. But, in case you are using Dial-On-Demand type of WAN links or you want to reduce the amount of traffic on some link connected to this port, then uncheck this item.

Periodic RIP broadcasts are automatically turned off when Dial-On-Demand is enabled in PPP port setup.

IPX Port Periodic SAP = [enabled l disabled]

Checking this item turns on periodic SAP broadcasts. Normally periodic SAP broadcasts should be enabled. But, in case you are using Dial-On-Demand type of WAN links or you want to reduce the amount of traffic on some link connected to this port, then uncheck this item.

Periodic SAP broadcasts are automatically turned off when Dial-On-Demand is enabled in PPP port setup.

IPX Port Discard Serialization Packets = [enabled | disabled]

Checking this item causes the IPX router to discard Novell Netware File Server serialization security frames received from the specified virtual IPX port. Novell Netware File Servers implement broadcast frames, often referred to as security frames, that contain serialization information regarding the license of the file server executable. This feature permits filtering of these broadcasts to help reduce WAN traffic and is not intended to interfere with copyright protection mechanisms.

This feature will be automatically turned on when Dial-On-Demand is enabled in PPP port setup.

IPX Port Watchdog Spoofing = [enabled | disabled]

Checking this item enables Novell Netware File Server Keep-Alive watchdog packet Spoofing. When a Netware workstation logs into a Novell Server, the Server will issue Keep-Alive messages to the client in order to determine if the workstation is active. The Keep-Alives are generated on a periodic basis and thus consume considerable bandwidth on low speed serial links. When enabled, the IPX Port Watchdog feature causes the RouteFinder to reply on the specified port, and on behalf of any IPX workstations located on a network reached via any other IPX virtual port.

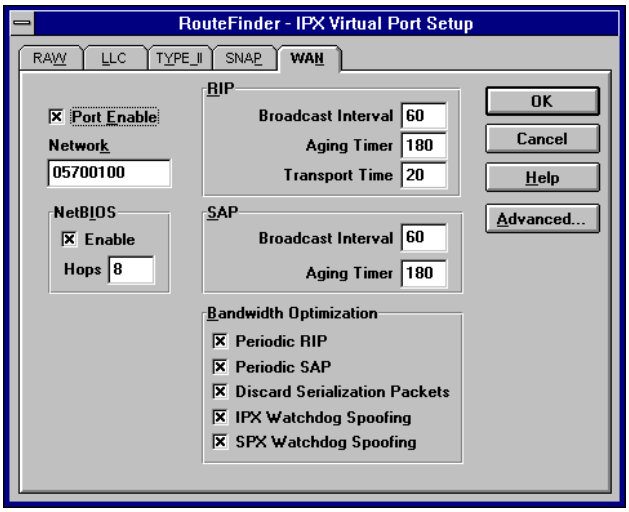
This feature will be automatically turned on when Dial-On-Demand is enabled in PPP port setup.

IPX Port SPX Watchdog Spoofing = [enabled l disabled

You can prevent Novell SPX session alive packets from travelling across the WAN link by enabling this option. The RouteFinder will generate the necessary data packets to keep sessions alive.

Add A New Network

If Frame Relay is enabled, then it is possiblle to add a new network. To add a new network, click on the WAN tab in IPX Virtual Port Setup dialog box. The IPX Virtual Port Setup dialog box changes to display the List of Logical WANs and the Number of Logical WANs, and three new buttons (Add, Delete, and Save Change).



Note: 16 networks it the maximum number of networks.

Delete a Network

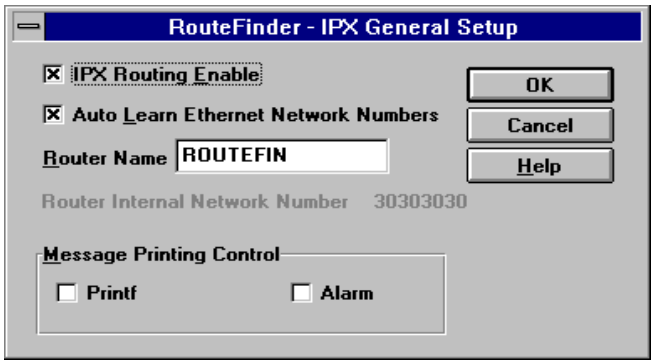
If Frame Relay is enabled, then it is possiblle to delete a new network. An existing network can be deleted by selecting it from the List of Logical WANs and clicking on the Delete button.

Save Change

The Save Change button is avilable only when Frame Relay is enabled and can be used to save changes made to parameters of a network. To change parameters of a network, select the network from the list of logical WANs and then change the parameters required and click on the Save Change button.

IPX General Setup

This dialog box allows you to setup the various configuration options for IPX routing protocol. The IPX General Setup dialog box is displayed by clicking on the IPX button in Router Setup dialog box. These options apply to all ports on which routing takes place.



IPX Routing Enable =[enabled | disabled]

Check this item to enable IPX routing. If IPX routing is disabled (this item is not checked) and Spanning Tree Bridging is enabled, IPX packets are bridged.

IPX Auto Learn Ethernet Network Numbers

RouteFinder can learn the IPX network address set up on the Ethernet from a Novell file server (or any other server, including routers, which support SAP). If you have a file server on the LAN side, you can make use of this feature.

IMPORTANT: Auto-Learn is setup so that the router attempts for some amount of time to learn the IPX network address of the LAN segment it is attached to. If it is not able to do this in the configured amount of time, then it will use the default network address as configured. In case this router comes up earlier than a file server on the same segment, it is possible that the router resorts to using the default network number. In such situation, you will get a warning on your file server about conflicting network numbers. In case this happens, reset the router to bring it up again (causing it to come up later than the file server). The file server will issue network number conflict warnings only a certain number of times.

If the LAN segment does not have a file server, then this option should be disabled.

IPX Router Name = [ASCII text string]

Defines a text name for the IPX router which is distributed to the other IPX services via SAP messages. This is 48 characters long.

IPX Router Internal Network Number = [32 bit hex IPX network number]

Defines a network number for a virtual LAN within the RouteFinder. This parameter is provided for Novell compatibility. Novell file servers define a similar virtual network number upon which the actual file server node resides in order to ensure that the file server remains equidistant from all other services located on the attached IPX networks.

The RouteFinder assumes the Ethernet port address's least significant 4 bytes for this value. In case this value clashes with any of your IPX internetwork values, contact Multi-Tech Support for advice, refer to Chapter 9.

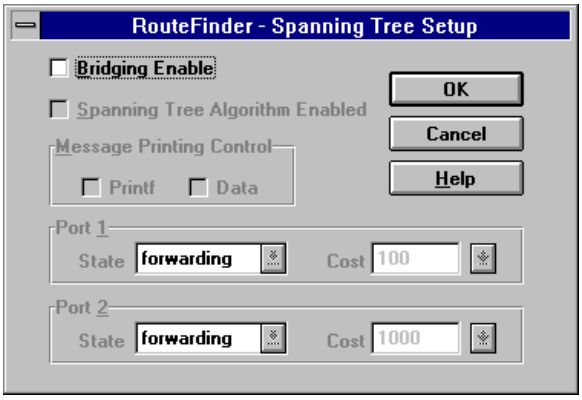
Message Printing Control

Items in this section control the display of various messages on the console terminal. Check the items that you desire to display messages. Normally you should not enable any of these items as they will degrade router performance.

5.2.8 Spanning Tree Bridging Setup

This dialog box lets you configure the parameters for transparent bridging or bridging using the Spanning Tree Algorithm as specified in IEEE 802.1d standard. Transparent bridging is between two remote Ethernet LANs.

Spanning Tree Algorithm is a protocol specified by the IEEE 802.1d standard for use by bridges to perform bridging. Bridges implementing this protocol interact with each other so as to prevent bridging-loops in an internetwork with redundant links to the same networks. This algorithm also allows for automatic use of alternative routes (provided there are redundant paths to the destination) in case the original route is unavailable for some reason.



Bridging Enable = [enabled I disabled]

The RouteFinder can do simple transparent bridging if this item is checked. This option allows you have a single WAN port connecting your network to an internetwork (like a Small Office Home Office (SOHO) setup).

Spanning Tree Enable = [enabled | disabled]

Checking this item enables Spanning Tree bridging. In case you do not use networking protocols other than IP and IPX, disabling bridging will make the router more efficient.

Bridging requires that the router see each and every packet on the connected LAN segment. This overhead is avoided when you disable the bridge. Note that if you enable bridging and disable routing of IP or IPX, bridging of these protocol packets takes place. You will need bridging to support networking protocols like NetBIOS.

Message Printing Control = [enable I disabled]

Check items for which you would like messages displayed on the console terminal. Normally all items should be disabled as enabling them will degrade router performance.

Spanning Tree Port State = [SS],[disabled | listening | learning | forwarding | blocking]

Defines the initial state of the port when running Spanning Tree algorithm. Set this parameter to the BLOCKING state to configure normal Spanning Tree operation. The Spanning Tree will transition from the BLOCKING state to fully automatic operation. Ports in the initial state of DISABLED will not participate in bridging.

Spanning Tree Port Path Cost = [SS],[decimal value]

Defines the cost associated with the specified port when running the Spanning Tree algorithm. Path cost is indicative of the relative cost of using this port to bridge to a distant network. Path cost is defined as 1000 divided by the megabit data rate of the network attached to the specified port. For example :

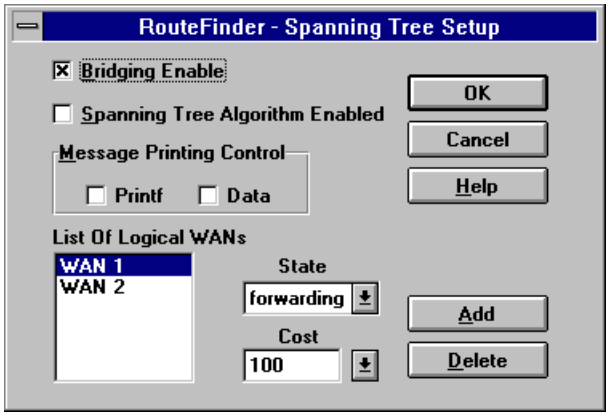
if the data rate is 19200 bps(i.e. 0.019M bps), then

cost = 1000 / 0.019

= 50000

Add A New Network

If Frame Relay is enabled, then it is possible to add a new network. To add a new network, click on the Add button in the Spanning Tree Setup dialog box. The List of Logical WANs adds a new network number to the list.



Note: 16 networks it the maximum number of networks.

Delete a Network

If Frame Relay is enabled, then it is possiblle to delete a new network. An existing network can be deleted by selecting it from the List of Logical WANs and clicking on the Delete button.

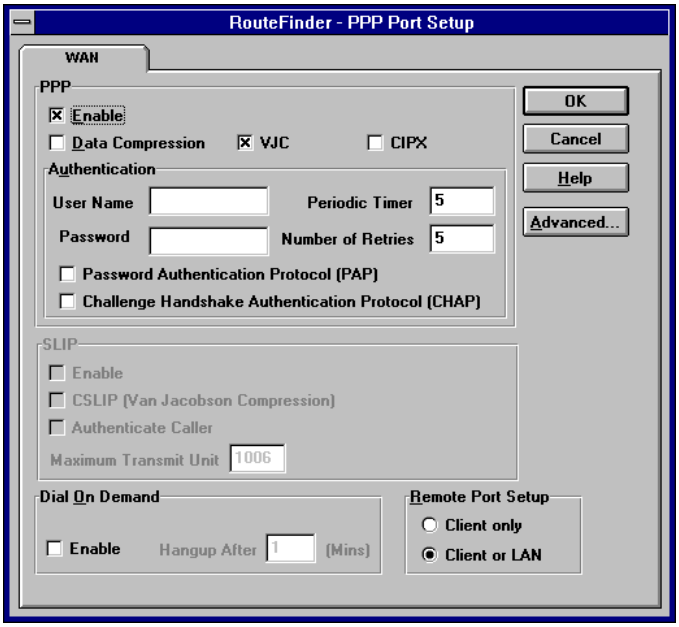
Modify a Network

To modify a Frame Relay network, click on the WAN number in the List of Logical WANs and modify the required parameter. Then, select any other WAN number in the List of Logical WANs and a message box appears "Data has Changed. Want to Save Changes" querying you whether you want to save the changes.

5.2.9 Point-To-Point Protocol Setup

This dialog box lets you setup the point-to-point protocol (PPP) options for each WAN port. Click on the PPP button in the Router Setup dialog box to display this dialog box.

Point-To-Point Protocol (PPP) is a protocol commonly used in serial links (asynchronous or synchronous) for the purpose of transferring packets between two end-points. This protocol basically allows the end-points to negotiate use of link and protocol parameters in a standardized way and also allows for standardized encapuslation of the packets being transferred between the end-points. The advantage of PPP is that it allows for inter-operability between end-points (say routers) using PPP for their serial communication.



PPP Enable = [enabled I disabled]

Enables the point-to-point protocol on the specified WAN port. If you enable SLIP on a dialing WAN port, this option will be grayed out. Either PPP or SLIP can be used at a given time. On a answering WAN port, however, the RouteFinder is capable of detecting the type of connection, PPP or SLIP.

PPP Port Data Compression = [enabled I disabled

Enable or disable compression of packets that will be sent through the PPP interface associated with the specified WAN port. Compression should be enabled on slower speed WAN links (speeds less that 57,600 baud) and if the modem is not doing any compression. At higher WAN speeds, compression should preferably be disabled as the compression process may be slower than the link throughput rates. Compression should also be disabled if the modem compression has been enabled.

PPP Port VJC Header Compression = [enabled I disabled]

The RouteFinder has compression for TCP/IP and IPX headers. In order for RouteFinder's to employ header compression on a particular PPP link, even the peer needs to support the selected compression algorighm.

Enable this parameter for VJC compression on TCP/IP headers on the selected PPP link.

PPP Port CIPX Header Compression = [enabled I disabled]

The RouteFinder has compression for TCP/IP and IPX headers. In order for RouteFinder's to employ header compression on a particular PPP link, even the peer needs to support the selected compression algorighm.

Enable this parameter for CIPX compression on TCP/IP headers on the selected PPP link.

Authentication

The RouteFinder supports the use of two user authentication protocols on PPP connections. One is Password Authentication Protocol (PAP) and the other is Challenge Handshake Authentication Protocol (CHAP). The PPP software in the RouteFinder internally negotiates the use of a suitable protocol with the remote router or remote access client software. For router to router connections, authentication is normally not used and the User Name and User Passoword fields as mentioned below are empty. In the case of Remote Access clients, this feature may be used.

PPP Port User Name = [ASCII text string]

Defines the user name to be used by PAP or CHAP when attempting to establish a link to the peer. The text string size is limited to 30 characters.

PPP Port Password = [ASCII text string]

Defines the password to be used by PAP or CHAP when attempting to establish a link to the peer. The text string size is limited to 30 characters.

PPP Port Periodic Timer = [decimal seconds]

This is the interfal with which the authentication process will periodically be involked.

Recommended value: 60 seconds

PPP Port Number of Retries = [decimal value]

The number of retries during each authentication using the PAP or CHAP protocols.

Recommended value: 5

PPP SLIP Enable

Enables the Serial Line IP (SLIP) on the specified WAN port. If you enable SLIP on a dialing WAN port, the PPP option will be grayed out. Either PPP or SLIP can be used at a given time. On a answering WAN port, however, the RouteFinder is capable of detecting the type of connection, PPP or SLIP.

PPP CSLIP (Van Jacobson Compression) = [enabled l disabled]

A TCP header that is transmitted over a serial link can be compressed using Van Jacobson Compression (VJC). The VJC Serial Line IP Protocol communicates between point-to-point links using TCP/IP. These SLIP packets are called CSLIP packets. The RouteFinder can transmit and receive CSLIP packets if this option is checked.

PPP SLIP Authenticate Caller = [enabled l disabled]

The MulltiRouter can authenticate the caller on a WAN port. SLIP doesn't provide an authentication feature like PPP. When a SLIP call is received on a answering port, the RouteFinder will try to authenicate the user name and password by prompting.

PPP SLIP Maximum Transmit Unit = [decimal value]

The RouteFinder restricts the maximum size of data packets transmitted to this number. The maximum value for this parameter is 1006.

Recommended: 1006

PPP Port Dial-On-Demand = [enabled l disabled]

The RouteFinder can be setup to bring down the connection on the WAN link when there is no real data traffic on the line. The RouteFinder will then automatically bring up the WAN link when there is a need for data to get across.

NOTE: The Novell IPX and SPX protocols generate some "session alive" packets. The RouteFinder tries to "spoof" these packets so that they don't keep the links up. The Novell File Server generated "Serialization" packets are also not transmitted across the WAN links for the same reason. Periodic broadcast of IPX RIP and SAP packets is also avoided on dial-on-demand links. In case of IP,RIP routing is entirely disabled and you will need to use default or static routes to support IP routing on the specified port.

Routing Information Protocol (RIP) is a protocol used among routers to exchange routing table information. RIP is the most common protocol used in both IP and IPX networks. RIP is also used internally by client workstations in IPX networks to obtain routes (shortest or otherwise) to any distant network.

PPP Port Hangup After = [decimal integer in minutes]

When a PPP port is setup for "Dail-On-Demand", the RouteFinder will bring the WAN communication device down (sets the DTR signal low) when no data is to travel across this link. The RouteFinder waits for this amount of time before it brings down the connection.

Recommended value: 3 minutes

Remote Port Setup

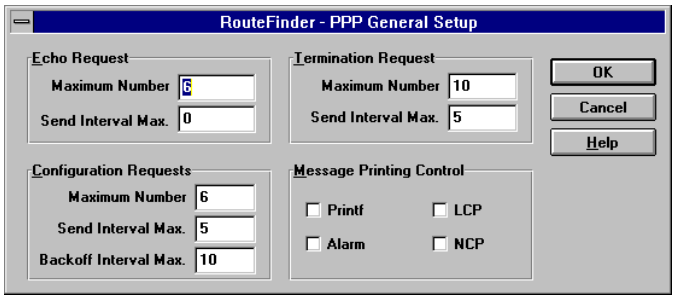
The RouteFinder can dial into another LAN and access its resources (Remote Access or RAS) as well as connecting to another PPP compliant router. This option is to set up the kind of PPP peer that the chosen link goes to.

Client Only - Enable this option if the PPP peer is a dial-up client. If you choose this option, you can save on IP addresses since the client's IP address will belong to the LAN network. Also, the IP address of the router's WAN port will be the same as the IP address of its LAN port.

Client or LAN - Enable this option if the PPP peer can be a dial-up client or another router. Note, that it is possible to use a dial-up client even if you have configured the port as a client or LAN. But, if the port is configured as a Client Only port, it is possible to achieve a definite savings in the number of IP addresses used.

Point-To-Point Protocol (PPP) General Setup

This dialog box lets you setup general PPP options for a WAN port. This dialog box is displayed by clicking on the Adanced button in the PPP Port Setup dialog box.



PPP Echo Requests Maximum Number = [decimal value]

Defines the number of unacknowledged LCP Echo Requests that will trigger terminating the link to the peer.

Recommended value: 20

PPP Echo Requests Send Interval Maximum = [decimal value]

Defines the interval, in seconds, that the LCP will insert between two consecutive LCP Echo Requests.

Recommended value: 5

PPP Termination Requests Maximum Number = [decimal value]

Defines the maximum number of LCP Termination Requests issued after completion of a back off interval. Once the maximum is reached with no response from the peer, LCP will commence issuing LCP Configuration Requests.

Recommended value: 10

PPP Termination Requests Send Interval Maximum = [decimal seconds]

Defines the interval, in seconds, that the LCP will insert between two consecutive LCP Termination Requests.

Recommended value: 5

PPP Configuration Requests Maximum Number = [decimal value]

Defines the number of LCP Configuration Requests to be sent befire backing off due to no response from the requests.

Recommended value: 20

PPP Configuration Requests Send Interval Maximum = [decimal seconds]

Defines the interval, in seconds, that the LCP will insert between two consecutive LCP Configuration Requests.

Recommended value: 5

PPP Configuration Request Backoff Interval Maximum = [decimal seconds]

Defines the interval, in seconds, that LCP will insert once the unanswered PPP Maximum Number Of Configuration Requests has been reached. Once this interval has transpired, PPP will commence termination of the link. See PPP Maximum Number Of Termination Requests.

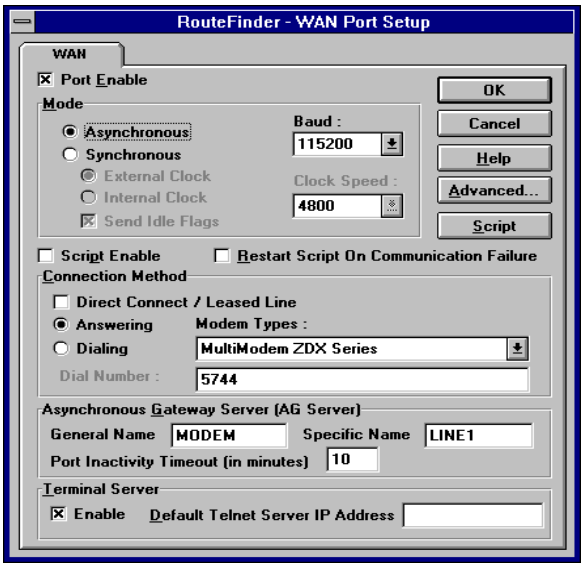
Recommended value: 10

Message Printing Control

Check items in this group to generate messages on various conditions. Normally all items should be disabled to avoid degradation of router performance.

5.2.10 WAN Port Setup

This dialog box lets you setup the wide area network (WAN) port options for the port. The WAN Port Setup dialog box is displayed by clicking on the WAN button in the Router Setup dialog box.



Port Enable =[enabled | disabled]

Check this option to enable the specific WAN port for routing or bridging.

Mode

Use the controls in this section to specify the mode of operation of the WAN link. The WAN link can operate in asynchronous or synchronous mode. In either case, the participating WAN port can be directly connected or via modems or DSU/CSUs.

If asynchronous mode of operation is selected, you need to specify the baud rate of the WAN link device.

If synchronous mode of operation is chosen, the clock can be supplied by the external device or can be generated. If internal clocking is chosen, you need to set the clock speed.

NOTE: In asynchronous mode only 8,N,1 (8 data bits, No parity, and 1 Stop bit) format is supported.

Enabling this parameter results in the RouteFinder sending idle flags on the synchronous WAN link when it is idle. This is the default setup.

Script

The RouteFinder supports a scripting facility on the WAN port that is configured as asynchronous. This feature can be very useful when some special handling has to be done on the WAN port (e.g., extra authentication, special communications equipment, etc.). Click on the Script button to create or edit a script for the WAN port. You can click on the Script Enable option to activate a script for the WAN port. You can also Restart a Script On Communication Failure by clicking on this option.

Connection Method

The controls in this section determine how the WAN device is connected to the WAN port. The WAN port on one router can be connected to a WAN port on another router either directly (**Direct Connect/Leased Line**) or via modems or DSU/CSUs with a dialup link (**Dialing or Answering**)

With dialup links, you need to specify one end of the WAN link as the dialing end and the other end as the answering end. So you need to appropriately select the router at one end of a WAN link (usually the router where the application or file servers are present) as the answering end (choose the **answering** button) and the router at the other end (usually the router where client software will run - because clients usually initiate conversations) as the dialing end (choose the **Dialing** button).

Modem Type - In case of an asynchronous link with a dialup method, you can specify the Modem Type that needs to be sent to the modem before dialing out or waiting for a call. Additionally, for dialing ends, you need to specify the telephone number of the router at the other end of the WAN link. In the event of a carrier loss on a dialup port, the router will try to automatically reconnect.

If the dialing button is selected, then the **Dial Number** text box is activated. Enter the telephone number of the router at the other end of the WAN link.

Send Idle Flags - [enable I disabled]

Enabling this parameter results in the RouteFinder sending idle flags on the synchronous link when it is idle. Normally, this is not required. But some router require idle flags (two consecutive delimiters, 7E and 7E) to be put on the link whenever it is idle.

Asynchronous Gateway Server (AG Server)

The RouteFinder supports Multi-Tech's Communication Services Interface (MCSI), Asyncrhonous Gateway server, or AG server or Netware Communications Services Interface NCSI). In order to provide this service, every asynchronous communications line has to have a unique MCSI name across the internetwork. An MCSI line name consists of the following three fields.

General Name - Maximum length of the name is eight (8) characters and can only consist of alphanumeric characters and no spaces.

Specific Name - Maximum length of the name is 14 characters and can only consist of alphanumeric characters and no spaces. This parameter pertains to the line name that would be visible by a communication package offering NASI capabilities.

The name of the AG server is assumed to be the same as the IPX router name with an AG suffix.

Port Inactivity Timeout (in minutes)

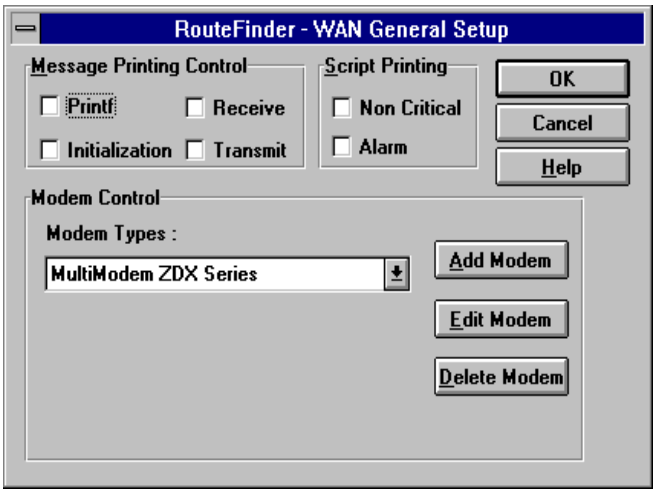
This value determines the amount of time a user can be idle before the user will be disconnected from the port. If the value is set to zero (0), the inactivity timer will be set to infinity and/or disabled. The default value is 10 and this sets up a resonable time for inactivity of 10 minutes.

Terminal Server

The RouteFinder has a built-in telnet client to connect incoming calls on the WAN port to a telnet host. The Default Telnet Server IP Address field contains the default address of the telnet server. When a terminal server session is being established on the WAN port, the RouteFinder contacts the telnet host addressed in this field.

WAN General Setup

This dialog box lets you configure some parameters related to the WAN port. The WAN General Setup dialog box is displayed by clicking on the Advanced button in the WAN Port Setup dialog box.



WAN Message Printing Control

Check items in this section that you want to be displayed on console messages. Normally all items should be disabled to avoid degradation of router performance.

Script Printing

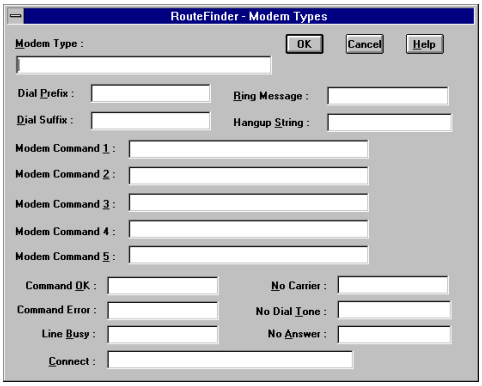
This group allows script printing during NonCritical periods or during an alarm condition.

Modem Control

You may use this control to set up the command and response strings of connectable modems. The RouteFinder stores the information about all types of modems in a common modem configuration file, called **modems.cnf**. The configuration file contains the commands that you want sent to the modem before dialing out.

Modem Type

Notice, that the modem highlighted in this dialog box is the modem you specified on the current communications link. Additionally, you will see the selected modem's communications strings.



You may program the Dial Prefix and Suffix, Ring Message, Hangup String, and Modem command responses. Refer to Appendix B for an explanation of the modem commands.

The Tilda (~) signifies a dealy of 0.5 seconds before transmission of the reset. Consective tildas increase the delay (i.e., ~~ equals one second). The caret (^) signifies a control character (i.e., ^M means Control M or carriage return).

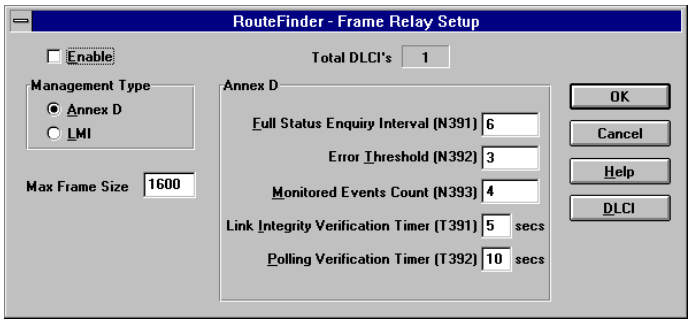
The string <BREAK> signifies that a break signal will be sent to the current communications port.

5.2.11 Frame Relay Setup

This dialog box lets you define the Frame Relay parameters. Frame Relay and PPP can not be enabled at the same time. If Frame Relay is enabled, then PPP button is grayed out so that it can not be enabled.

Frame Relay is a multiplexing protocol designed to operate over transmission facilities that are virtually error free. In Frame Relay, frames are routed through the network on the basis of an attached label called a Data Link Connection Identifier (DLCI). Frame Relay combines the bandwidth efficiency of packet switching with end-to-end protocol transparency and increased speed and performance.

The DLCI is the identification of a particular logical link in the Frame Relay network and has local significance only. As the logical link traverses the Frame Relay network, input DLCI will be mapped to an output DLCI at every node. Access DLCIs for permanent logical links are assigned at subscription time. Trunk DLCIs are allocated dynamically. The valid value for a DLCI ranges from 16 to 1007.



Maximum Frame Size

This parameter displays the maximum allowable frame size. This parameter is a display type only.

Recommended Value: 1600

Management Type

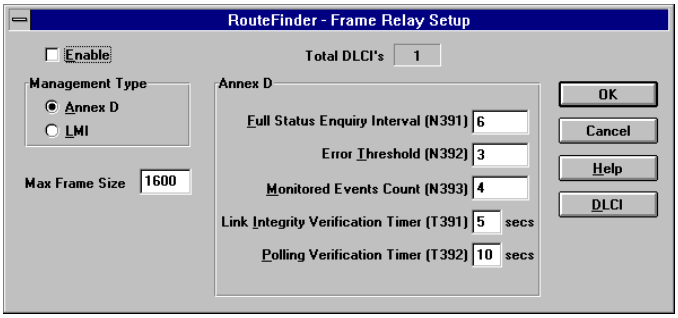
The Management Interface can be either Annex D or Local Management Interface (LMI). Selection between these two depends on the configuration of the Frame Relay supporting network. Depending on this selection other parameters can be modified.

Annex (Annexure) D provides additional procedures for permanent virtual connections using unnumbered information frames. Annex D describes the means for notification of outage of a permanent virtual connection and recovery from such a condition. This follows the ANSI T1.617 standards.

LMI describes a protocol and associated procedures operating on the local interface between the user and the network. It notifies the user of the addition, deletion, and presence of the Phased Lock Loop (PLL) in the network. It also notifies the user of the end-to-end availability or unavailability of a PLL. Basic LMI protocol is based on synchronous polling scheme where the user polls the network to obtain status information on the PLLs configured on the interface. LMI simply augments the ANSI/CCITT standard Frame Relay protocol and in no way interferes with the normal operation of user PLLs on the interface.

Annex D

When Annex D is chosen, the following parameters can be modified.



Full Status Enquiry Interval (N391)

Link Integrity Verification is used to determine the status of the channel and hence to update the staus of PVCs. Value specified is in seconds.

Range: 1-255

Recommended Value: 6

Error Threshold (N392)

The Error Threshold is the number of events that should occur without any errors.

Range: 1-10

Recommended Value: 3

Monitored Events Count (N393)

This value specifies the number of events that could occur with a maximum Error Threshold so that the link could be restored in case of failure.

Range: 1-10

Recommended Value: 4

Note: The Error Threshold should be less than or equal to the Monitored Events Count. If Monitored Events Count is set to a value much less that the Full Status Enquiry Interval, then the link could go in and out of error condition without the user equipment or network being notified.

Link Integrity Verification Timer (T391)

This value specifies the period for the timer. Its value is specified in seconds.

Range: 5-30

Recommended Value: 5

Polling Verification Timer (T392)

The Polling Verification Timer specifies the maximum amount of time (in seconds) the network should wait for a response from the remote user equipment.

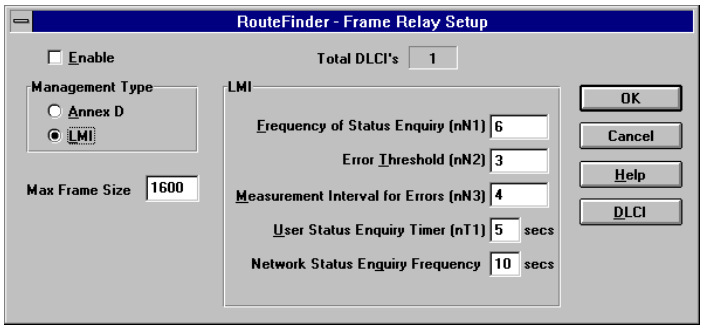
Range: 5-30

Recommended Value: 10

Note: The Polling Verification Timer should not be greater than the Link Integrity Verification Timer.

Local Management Interface (LMI)

When LMI is chosen, the following parameters are modifiable.



Frequency of Status Enquiry (nN1)

The amount of time (in seconds) after which the polling needs to be done to update status of the PVCs.

Range: 1-10

Recommended Value: 6

Error Threshold (nN2)

It specifies the number of errors that should occur on a LMI link before an error is reported. The number specified is the number of events.

Range: 1-10

Recommended Value: 3

Measurement Interval for Errors (nN3)

It specifies the amount of time for which Error threshold has to be checked. For example a value of 4 specifies that 1 in 4 messages should be checked for errors.

Range: 1-10

Recommended Value: 4

Note: Error threshold should be less than or equal to Measurement Interval for Errors.

User Status Enquiry Timer (nT1)

It specifies the maximum amount of time (in seconds) for the network to respond to user's Status Enquiry request.

Range: 5-30

Recommended Value: 5

Network Status Enquiry Frequency(nT2)

It is the frequency at which the Network expects to receive Status Enquiry Information for updating the status of all PVC's. Its value specified in seconds.

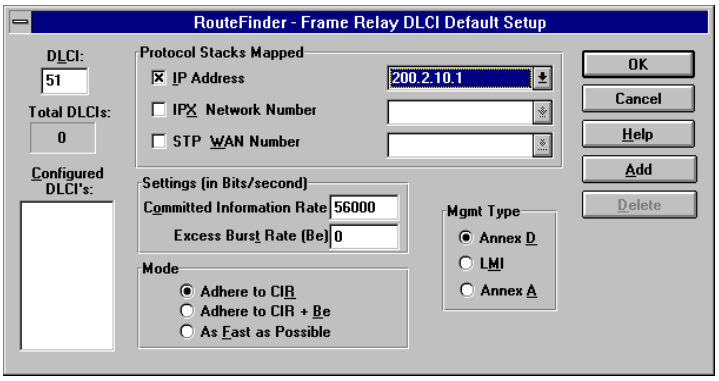
Range: 5-30

Recommended Value: 10

Note: Network Status Enquiry Frequency Timer should be greater than User Status Enquiry Timer.

DLCI

This dialog box allows you to add, delete and modify DLCI parameters. The Frame Relay DLCI dialog box is displayed by clicking on the DLCI button in the Frame Relay Setup dialog box.

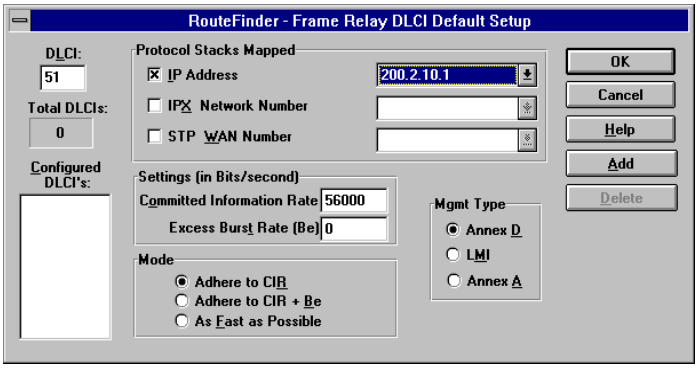


Adding a DLCI

Enter the DLCI Number to be added in the DLCI field. If you had already selected a DLCI from the list of Configured DLCI's and modified it, then before adding the new DLCI you will be queried if you want to save the changed parameters. After entering the DLCI, you can map it to a protocol stack.

Note: It will not be possible to have more than sixteen DLCIs.

For mapping to a protocol stack you should enable the required stack by checking its check box. Then you should properly choose an address from the combo box of that protocol stack.



The Committed Information Rate (CIR) and Excess Burst Rate (Be) indicate the values at which the PVC operates on. These two parameters will take care of congestion problems. The Mode group will be by default set to Adhere to CIR. This can also be changed to As Fast As Possible but the network may lose data packets when it is not capable of handling the excess data. After setting all the parameters, you should click on the Add button that will add the number entered into the List Box of Configured DLCI's.

Note: The value of Excess Burst Rate + Committed Information Rate should not exceed the Link Speed, otherwise the network will not be able to operate properly.

Deleting a DLCI

Choose the DLCI to be deleted from the list of Configured DLCI's. After you select the DLCI, the Delete button will be enabled and clicking it will delete that DLCI. You can verify that the DLCI has been deleted by viewing the Configured DLCI's list Box.

Modifying Parameters of a DLCI

Select the DLCI for which parameters have to be changed, then change the required parameters. Once you make a change, the Save Changes button is enabled which allows you to save the changes.

IP Address

If you want to map the currently selected or added DLCI to an IP Address, then you should check this option. It will allow you to map the DLCI to one of the IP Addresses. IP Addresses shown here will include the currently added IP Addresses also.

IPX Network Number

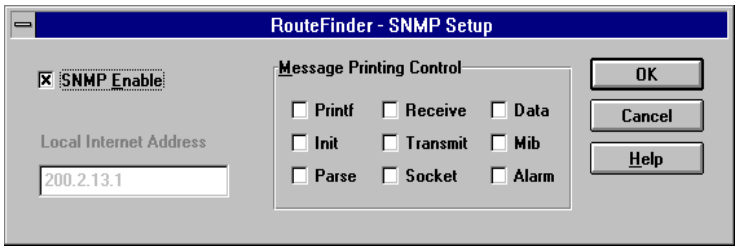
If you want to map the currently added or selected DLCI to a Network Number, then this check box has to be checked and clicking on the down arrow in the Network Number list box. It will display the currently available Network Numbers.

STP Port Number

If presently selected or added DLCI has to be mapped to a Spanning Tree Port (STP), then check this option. It displays the available Port for configuration in its combo box out of which only one has to be selected.

5.2.12 SNMP (Simple Network Management Protocol) Setup

RouteFinder's SNMP related parameters are configured through this dialog box. The SNMP Setup dialog box is displayed by clicking on the SNMP button in the Router Setup dialog box.



SNMP Enable = [enabled | disabled]

Enables or disables SNMP management support.

SNMP Local Internet Address = [doted decimal address]

The local internet IP address for SNMP in the dotted decimal format.

This is always set to be the same as the IP address of the Ethernet port and can not be edited.

Message Printing Control

Check items in this group for messages on various conditions. Normally all items should be disabled to prevent degradation in router performance.

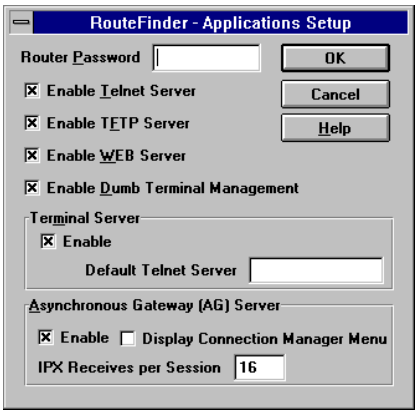
5.2.13 Applications Setup

This dialog box lets you set up support for Telenet, TFTP (Trivial File Transfer Protocol), WEB, and Asynchronous Gateway servers in the RouteFinder[100]. This dialog box is displayed by clicking on the Applications button in the Router Setup dialog box.

Telnet is an applications level protocol commonly found in IP based networks that allow terminal emulation at a remote workstation. To do this, there is usually a server at a central point that allows multiple clients to connect and request to use the service. The service could be anything. Usually it is terminal emulation. The MultiRotuer has a Telnet server that allows multiple clients to view statistics information from the box. Telnet is usually implemented over TCP.

TFTP is a file transfer protocol that uses UDP and provides a simple method for transferring files between two nodes (one the server and the other the client).

The RouteFinder[100] also supports Multi-Tech's Communications Services Interface (MCSI), Asynchronous Gateway server, or AG server or Netware Communications Services Interface (NCSI). In order to avail this service every asynchronous communication line has a unique MCSI name across the internetwork.



Router Password

The RouteFinder[100] can be accessed for configuring, monitoring and dialing out on the internet. In order to ensure security for such accesses, a passwork can be provided in this filed.

Enable Telnet Server

The RouteFinder[100] has a built-in Telnet Server. Using any standard Telnet client, authorized users can access the server and perform the following:

1) **Dial out** - Using a Telnet client, a user with proper authority (assigned in the user database) can dial-out on certain specific ports of the RouteFinder[100] to connect to services like BBSes. The RouteFinder[100] has three WAN ports which can be used for dial-out. But, a WAN port will NOT be available for dialing out if:

It is already used for routing,
It is already used for dialing out,
There is a call back in progress,
It is used for configuring a device connected on it,
It is a port setup to dial-out to connect to another router,
If it is not configured as an asynchronous port.

2) **View router configuration and statistics** - Any one who has the router password can access the router with any standard Telnet client to view the configuation and statistics.

3) **Modify router configuartion** - Any one who has the router password can access the router with any standard Telnet client to modify the configuration.

4) **WAN device configuration** - Any communication device connected to a WAN port can be directly accessed using this option. This is useful in setting up devices like modem, ISDN Terminal Adapter, etc., for routing opertions. At the end of WAN degfice configuration the router reboots automatically.

A WAN port will NOT be available for device configuration if:

It is already used for routing,
It is already used for dialing out,
There is a call back in progress,
It is used for configurating a device connected to it.

5) **Modify remote user database** - This option in the Telnet server lets you view, create and modify user information maintained in the RouteFinder[100]. This user database is used for dialing in and dialing out clients.

Enable TFTP Server

The RouteFinder[100] also has a built-in TFTP Server for configuration and firmware updates across the IP internetwork. TFTP is a file transfer protocol that uses UDP and provides a simple method for transferring files between two nodes (the server and a client).

Check this option to enable the TFTP Server

IMPORTANT: For security reasons, this option should be disabled once your RouteFinder[100] is setup completely since anyone on the internetwork can change the routers configuration by performing a TFTP upload.

Enable Dumb Terminal Management

A router administrator can connect a dumb terminal to the command port (directly or using modems and access the router for configuation and management. If you plan to use this feature, check this option.

Enable Terminal Server (Telnet)

The MultiRotuer has a built-in telnet client which can connect an incoming call from a terminal (dumb or intelligent) to a telnet server. Check this option to use this feature.

Default Telnet Server IP Address

Enter the IP address of the Default Telnet host address here. When the MultiRotuer tries to look for a telnet host to connect to, it first will look in the WAN port specific telnet host address field. If no host address is found in that field, the router will look in this field for the address of a telnet host. If both fields are empty, the user will be asked to type in the address of the telnet host to connect to. (If DNS resolver is enabled and the DNS Name server is available, the user can enter the domain name instead of the IP address).

Asynchronous Gateway (AG) Server

The RouteFinder[100] supports a built-in async communications gateway. The AG Server group allows the server to be enabled or disabled, display one of two connection manager logon screens, and displays the IPX receives per session.

Enable =[enable I disabled]

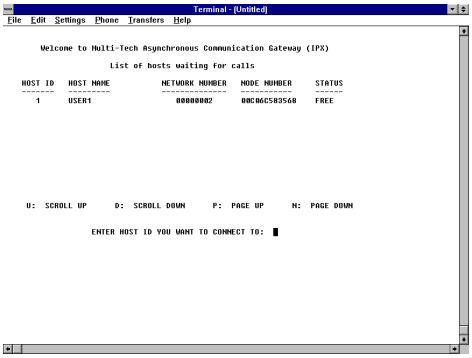
Enables or disables the Async Gateway (AG) server. If the AG Server is disabled in the Applications Setup dialog box, the AG Server dialog box in the WAN Port Setup dialog box will not appear.

Display Connection Manager Menu =[enable I disabled]

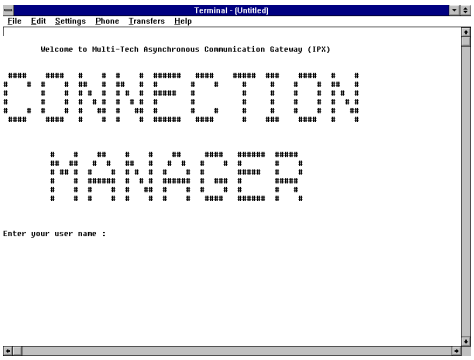
A Remote Control client can be greeted with one of two types of logon screens, if a Remote Control Host is waiting for a connection through the gateway and the software redirector is set for inbound mode. The type of logon screen is dependent on if the Display Connection Manager Menu check box is enabled or disabled. If the Display Connection Manager Menu check box is enabled (checked), the default Logon screen is displayed with a list of the hosts waiting for a connection. An optional logon screen which displays the words CONNECTION MANAGER is displayed if the Display Connection Manager Menu check box is not checked.

Default Logon Screen

The default Logon screen displays a list of the hosts waiting for a connection and allows the remote control client to see and select the number correlating to the desired host.


Terminal - [Untitled]
File Edit Settings Phone Transfers Help
Welcome to Multi-Tech Asynchronous Communication Gateway (IPX)
List of hosts waiting for calls
HOST ID HOST NAME NETWORK NUMBER NODE NUMBER STATUS
1 USER1 00000002 00C06C583568 FREE
U: SCROLL UP D: SCROLL DOWN P: PAGE UP M: PAGE DOWN
ENTER HOST ID YOU WANT TO CONNECT TO:

Optional Logon Screen - The optional Logon Screen requires the client to know which remote control hosts are waiting for a connection. The client is prompted for a user name and password and will have to enter the appropriate information to access the host (if available). Main difference is there's no list showing the available hosts and thus the remote user will not know how many remote control hosts are available. Some administrators may find this to be a security perk.


Terminal - [Untitled]
File Edit Settings Phone Transfers Help
Welcome to Multi-Tech Asynchronous Communication Gateway (IPX)
Enter your user name :

IPX Receives per Session = [decimal value]

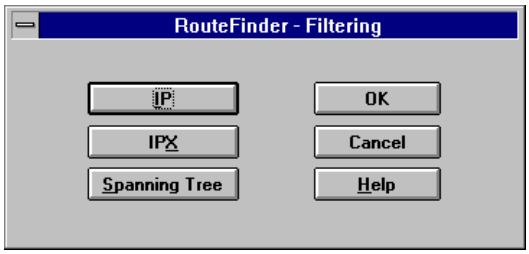
This control provides the maximum number of IPX receive commands allowed.

Recommended value: 16

5.2.14 Filtering

The RouteFinder has the capability to filter data packets from getting through the link. The administrator can impose filtering for security, against misuse and restricted usage of the WAN link. The RouteFinder implements a very flexible method for installing filters.

Note: It should be kept in mind that the RouteFinder will need to do extra processing when filters are installed (it needs to look into each packet that has to be routed or bridged). Thus installing to many filters may lead to performance degradation.



IP Filtering

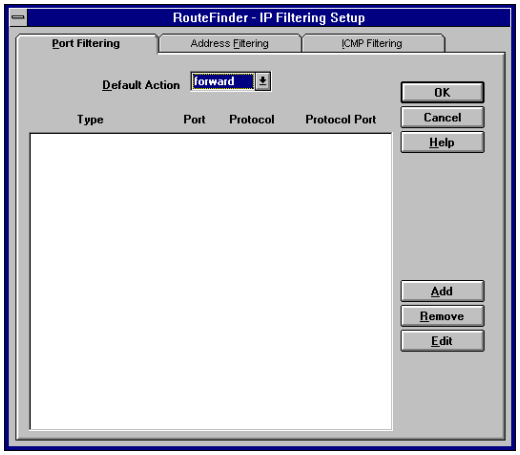
This button is used to select installing filters for the Novell IP protocol (Internet Protocol).

There are two types of IP filtering supported by the RouteFinder. The IP Protocol Port based filtering and the IP Address based filtering.

IP Protocol Port Based Filtering

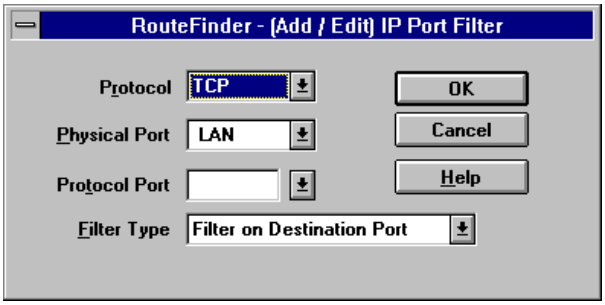
In this method, IP packets can be filtered based on their specific purposes (e.g., Telnet packets (TCP based) or TFTP (UDP based) which can be filtered or forwarded.

Select the tab labelled Port Filtering to perform protocol port based Filtering. This tab lets you setup filtering of IP packets based on the higher level protocol supported. The controls that appear in this tab are explained below.



The **Default Action** pull down menu defines a received IP packet whose IP protocol port is not found in the filtering database. This packet will either be filtered or forwarded as set in this field. The default setting for this option is **Forward**.

The filtering entries list (Type, Port, Protocol, and Protocol Port) lists the currently established IP filters in the RouteFinder database. The first column shows the type of filter(e.g., Filter on source address being equal or forward on destination address being equal, etc.). The second column lists the physical port (LAN or WAN) on which the filter is applicable. The third column shows the IP protocol (TCP or UDP) for which we need the filtering. The fourth column shows the protocol port number, like for Telenet or TFTP.



To add an IP Port Filter, the Add IP Port Filter dialog box is displayed that lets you add a new entry to the IP filtering database.

Protocol TCP or UDP

Physical Port LAN or WAN

Protocol Port Port Number (Some well known ports can be selected from the predefined list, e.g., Telenet or FTP).

Filter Type

Filter on Destination Port - Drop all IP packets whose destination IP protocol port matches with the IP protocol port entered in the above field.

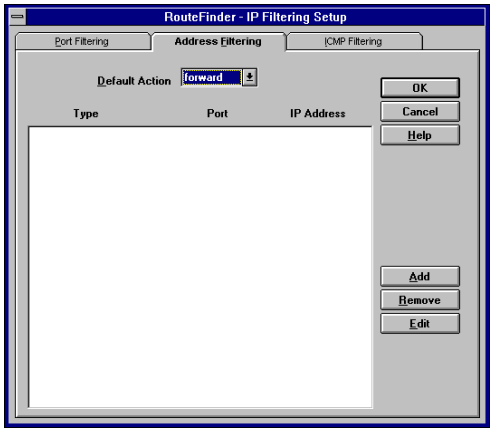
Filter on Source Port - Drop all IP packets whose source IP protocol port matches with the IP protocol port entered in the above field.

Forward on Destination Port - Forward all IP packets whose destination IP protocol port matches with the IP protocol port entered in the above field.

Forward on Source Port - Forward all IP packets whose source IP protocol port matches with the IP protocol port entered in the above field.

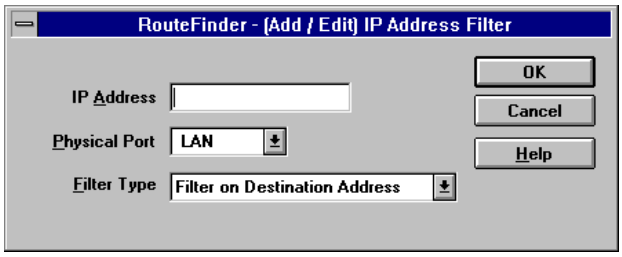
IP Protocol Address Based Filtering

In this method, filtering is based on the source and destination IP addresses in the packet.



The **Default Action** pull down menu defines a received IP packet whose IP address is not found in the filtering database. This packet will either be filtered or forwarded as set in this field. The default setting for this option is **Forward**.

The filtering entries list (Type, Port, and IP Address) lists the currently established IP filters in the RouteFinder database. The first column shows the type of filter(e.g., Filter on Source Address being equal or forward on destination address being equal, etc.). The second column lists the physical port on which the filter is applicable. The third column shows the IP address for which we need the filtering.



To add an IP Address Filter, the Add IP Address Filter dialog box is displayed that lets you add a new entry to the IP filtering database.

IP Address — IP address for filtering or forwarding

Physical Port — LAN or WAN 1

Filter Type

Filter on Destination Address - Drop all IP packets whose whose destination IP address matches the IP address entered in the above field.

Filter on Source Address - Drop all IP packets whose source IP address matches the IP address entered in the above field.

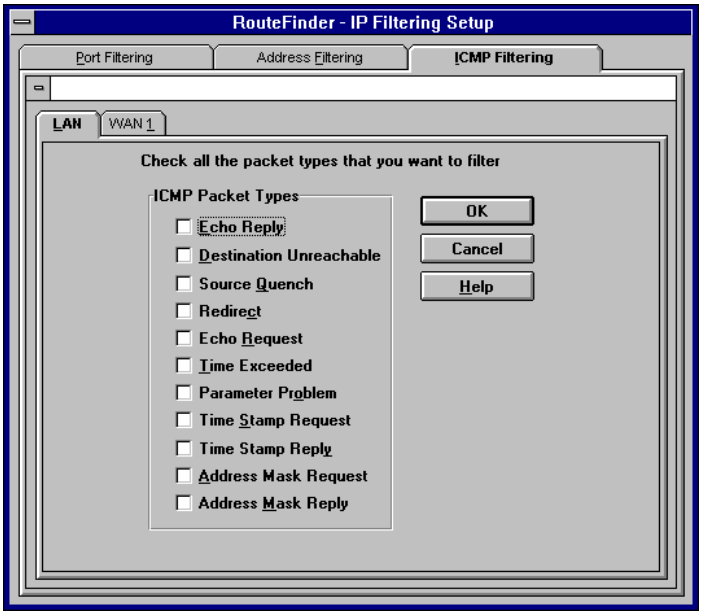
Forward on Destination Address - Forward all IP packets whose destination IP address matches the IP address entered in the above field.

Forward on Source Address - Forward all IP packets whose source IP address matches the IP address entered in the above field.

ICMP Filtering

Separate filtering support is provided for specific kinds of received ICMP packets.

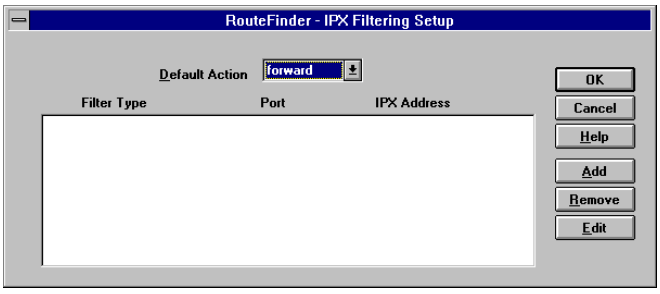
Internet Control Message Protocol (ICMP) is used in IP networks as an internal protocol for nodes to exchange control and diagnostic information. Applications normally will not use ICMP for any purpose.



Select the tab labelled ICMP Filtering to setup filters for received ICMP packets. Two tabs let you choose the kind of ICMP packet to filter for each of the IP ports (LAN and WAN). Check the ICMP packet type to filter the packet received on a port. Use the tabs on the left to choose the port to perform the filtering action on. Select OK once all your choices have been made.

IPX Filtering

The IPX packets that are received by the RouteFinder can be selectively filtered or forwarded based on their IPX address.



Default Action

A received IPX packet whose IPX source address or IPX destination address is not found in the filtering database will be either filtered or forwarded as set in this field.

The default setting of this option is **forward**.

Filtering Entries List

This area lists the currently established IPX filters in the RouteFinder database. The first column shows the type of filter (like filter on source address being equal or forward on destination address being equal, etc.). Second column list the port on which the filter is applicable. Third column shows the IPX address for which we need the filtering.

Add

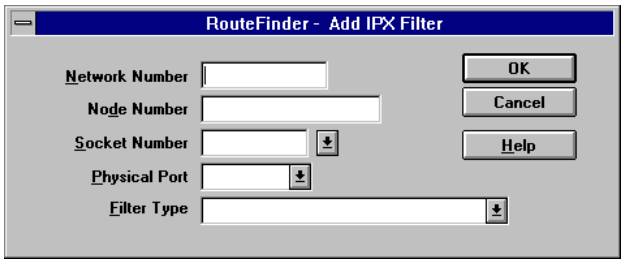
This option establishes a new IPX filter in the filtering database.

Remove

Current selection in the filtering database list can be deleted with this option.

Edit

Current selection in the filtering database list can be edited with this option



To add an IPX filter, the Add IPX Filter dialog box is displayed that lets you add a new entry to the IPX filtering database.

Network Number	The network number to be checked for filtering or forwarding.
Node Number	The node number to be checked for filtering or forwarding.
Socket Number	The socket number to be checked for filtering or forwarding. Alternatively some well known sockets like SAP, RIP can be chosen from a predefined list.
Physical Port	Defines the physical port on which the filtering is to be performed.

Filter Type

Filter on Destination Address - Drop all IPX packets whose whose destination IPX address matches the IPX address entered in the above field.

Filter on Source Address - Drop all IPX packets whose source IPX address matches the IPX address entered in the above field.

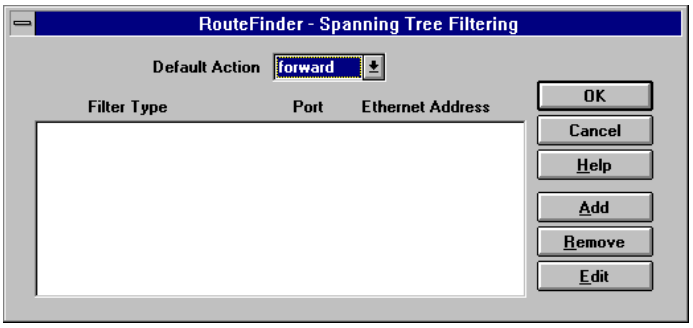
Forward on Destination Address - Forward all IPX packets whose destination IPX address matches the IPX address entered in the above field.

Forward on Source Address - Forward all IPX packets whose source IPX address matches the IPX address entered in the above field.

Spanning Tree (Transparent Bridging) Filtering

The administrator can restrict certain nodes from using the Spanning Tree (transparent bridging) feature of the RouteFinder. It is also possible to restrict the access only to a specific node.

Spanning Tree Algorithm is a protocol specified by the IEEE 802.1d standard for use by bridges to perform bridging. Bridges implementing this protocol interact with each other so as to prevent bridging-loops in an internetwork with redundant links to the same networks. This algorithm also allows for automatic use of alternative routes (provided there are redundant paths to the destination) in case the original route is unavilable for some reason.



Default Action

A received packet whose Ethernet source address or destination address is not found in the filtering database will either be filtered or forwarded as set in this field. The default setting of this option is **forward**.

Filtering Entries List

This area lists the currently established Spanning Tree filters in the RouteFinder database. The first column shows the type of filter (like filter on source address being equal or forward on destination address being equal, etc.). The second column list the port on which the filter is applicable. The third column shows the Ethernet MAC address for which we need the filtering.

Add

Chose this option to established a new filter in the filtering database.

Remove

Current selection in the filtering database list, if any, can be delected with this option.

Edit

Current selection in the filtering database list, if any, can be edited with this option.

To add a Spanning Tree filter, the Add Spanning Tree Filter dialog box is displayed that lets you add a new entry to the database.

Ethernet Address — The MAC (Ethernet) address to which we need to apply this filter.

Physical Port — Defines the physical port on which the filtering is to be performed.

Filter Type

Filter on Destination Address - Drop all packets whose destination MAC address matches the Ethernet address entered in the above field.

Filter on Source Address - Drop all packets whose source MAC address matches the Ethernet address entered in the above field.

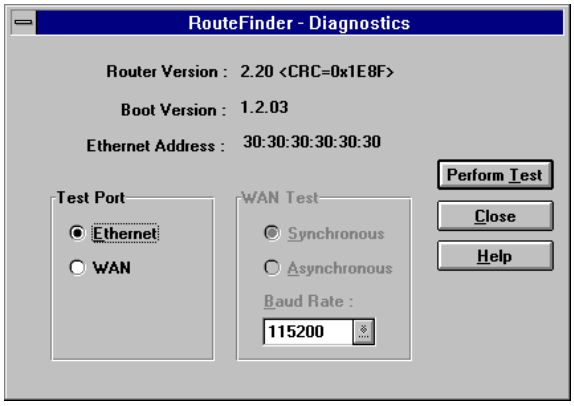
Forward on Destination Address - Forward all packets whose destination MAC address matches the Ethernet address entered in the above field.

Forward on Source Address - Forward all packets whose source MAC address matches the Ethernet address entered in the above field.

Note: If a packet is received with both its source address and destination address in the filtering database, the action specified on the source address will be performed.

5.2.15 Diagnostics

RouteFinder Setup program lets you perform various hardware tests on the LAN and WAN links. The Diagnostic dialog box is displayed by clicking on the Diagnostic button in the Router Setup dialog box. Diagnostic tests are performed if the Communication type of the Local Port configuration is set to COM Port. If the Local Port configuration is set for IP, no diagnostic test are performed by the RouteFinder.



When this dialog box is closed, the router will reboot.

Router Version and CRC

This field displays the version of RouteFinder Firmware that is running. It also displays the Checksum (CRC) of stored firmware.

Boot Version

This field displays the version of Boot Code that is present in the target.

Ethernet Address

This is the Ethernet Network interface address of RouteFinder's Ethernet Port. This field can not be modified.

EtherNet Port Test

You can do a loop back test on the Twisted Pair (RJ45) EtherNet connector. To perform this test you need a special RJ45 Loop back cable connected to your RouteFinder. Refer to Appendix A for cable specifications.

WAN Port Test

The WAN port can be tested in synchronous or asynchronous mode.

To test the WAN port in **Synchronous** mode, select the port and then click on the **Perfom Tests** button to initiate the test. Results of the test will be displayed after a while.

Note: In case of an error message during this test, make sure that you have connected a DSU in loop back mode to the correct WAN port. You will also be able to see the Send Data and Receive Data indicators blink during the test. Since the RouteFinder expects an external clocking device during synchronous operation, it is not possible to conduct this test without a synchronous DCE.

To test a WAN port in **Asynchronous** mode, either an asynchronous RS-232 Loop-back cable or a modem having loop-back mode is needed. Also in this mode, you need to choose the baud rate at which the test has to be performed. If you are using a modem in loop-back mode, refer to the modem user manual for defails on setting it up. Modems support various loop-back modes like local digital, local analog, remote digital and remote analog. You may choose Local Digital for testing the WAN port.

Once the loopback is setup, you should choose the WAN port and baud rate and then click on **Perform Test.** If an error occurs, check your loopback setup once again.

WAN Link Test

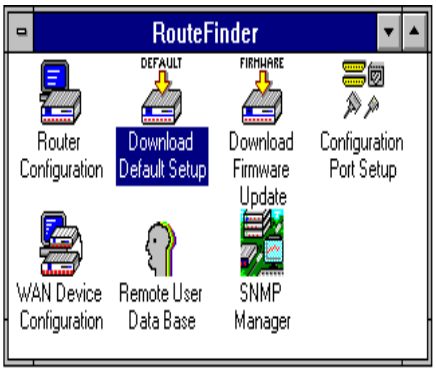
Since the Setup software does a loopback test (sends a pattern and expect to receive the same pattern), it can be used to test the RouteFinder hardware port and also the actual communicaiton link used for routing.

Also, on leased lines you can test the entire link and the remote DCE by putting remote DCE in loopback mode. Consult the user manual of the DCE for doing this.

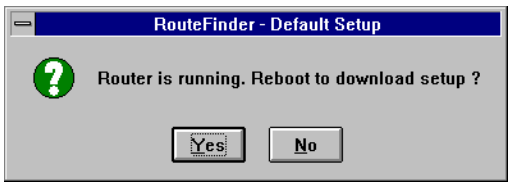
Certain modems support remote analog and digital loop-back modes. If you are using these types of modems you can conduct link tests on Dial up lines. Consult you modem owner's manual for this.

5.3 Download Default Setup

To download a default configuation to the RouteFinder, double click on the Download Default Setup icon. In case the FAIL LED does not go off after a long time, then you should try to do a Download Default Setup and Download Firmware Update.



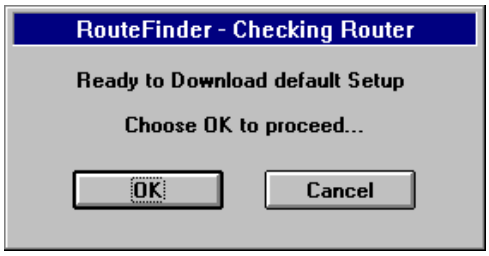
The "Router is running. Reboot to download setup?" dialog box is displayed.



Click on **Yes** to download setup. Click on **No** to return to the RouteFinder Program Group.

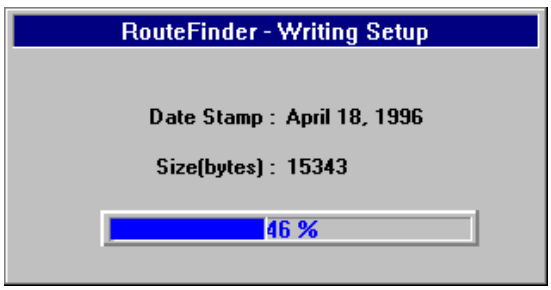
The "Looking for response from Router" dialog box is displayed only for a brief time.

The Checking Router dialog box is displayed.

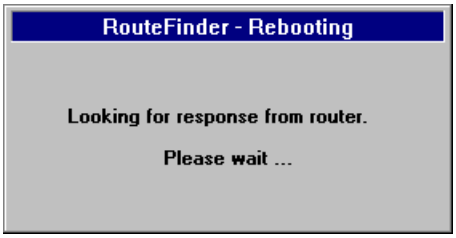


The Setup utility is "ready to download the default setup Choose OK to proceed." Click on **OK** to proceed.

The Writing Setup dialog box is displayed while the setup configuration is written to the RouteFinder.



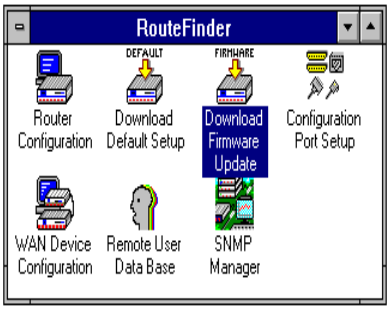
The FAIL LED on the RouteFinder lights as the software is downloaded.



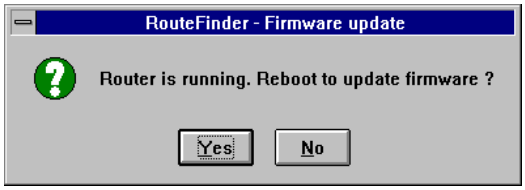
After the RouteFinder is rebooted, you are returned to the Program Manager and the RouteFinder is running.

5.4 Download Firmware Update

To download a new version of firmware, double click on the Download Firmware update icon.

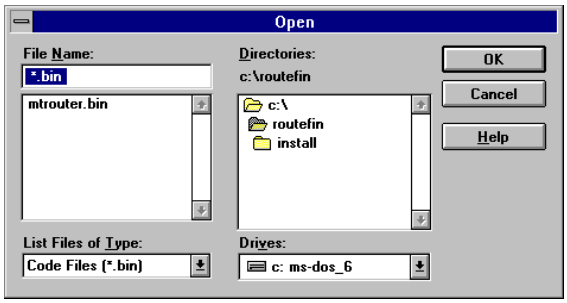


The "Router is running. Reboot to update firmware?" dialog box is displayed.

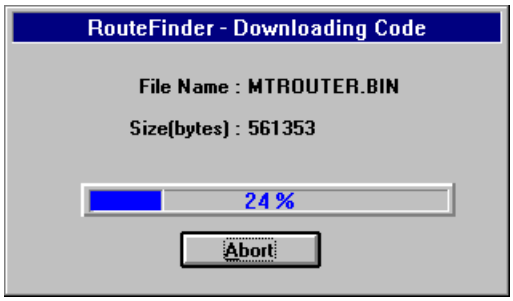


Click on **Yes** to update firmware. Click on **No** to return to RouteFinder Program Group.

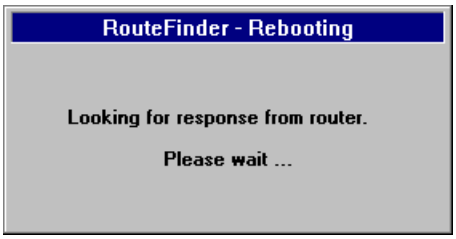
The Open dialog box is displayed. This dialog box lets you select the file, source directory, type of file, and the drive on which the file resides. Click on the **OK** button when you are satisfied with your selections.



The "downloading code" dialog box is displayed showing the percentage of code that is downloaded.



When the new code is downloaded into the RouteFinder, the unit will be rebooted. The "Looking for response from router" is displayed.



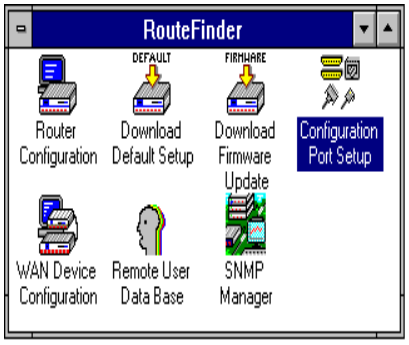
After the RouteFinder is rebooted, you are returned to the Program Manager and the RouteFinder is running.

5.5 Configuration Port Setup

The Configuration PortSetup icon lets choose and setup parameters for the port through which the RouteFinder Setup program will communicate (either directly or through modem or through the network using TFTP over IP) with the target. In case you use modems for communication, you can specify any initialization commands that need to be sent to the modem before dialing the number.

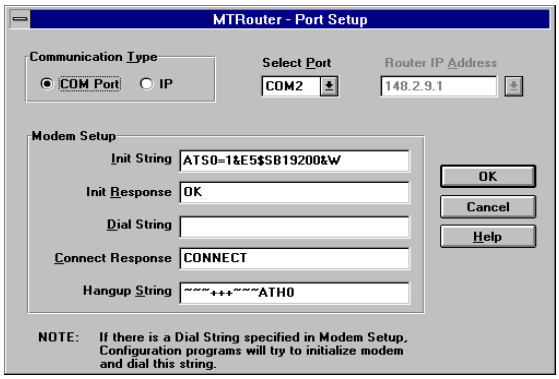
NOTE: The parameters setup through this application are used in the programs Download Default Setup, Download Firmware Update and Router Configuration.

Double click on the icon to display the local port setup dialog box.



You may also start the Configuration Port Setup from the File Manager by selecting the RouteFinder directory and double clicking on the psetup.exe program in the file list.

You may also run the Configuration Port Setup from either the Program Manager or the File Manager by clicking on the Run command in the File Menu, then typing: C:\mtrouter\psetup.exe in the Command Line field.



This dialog box lets you set the Local port parameters. The setup utility uses the selected port to communicate with the Target (either directly or through modems). You can also specify any initialization commands to the modem which will be sent to it before dialing the number.

Communication Type

The configuration program can use the serial COM port of the PC or the IP based Trivial File Transfer Protocol (known as TFTP) to read and write the configuration from the RouteFinder.

If a PC COM port is used, you will need to connect the selected port to the Command Port of the RouteFinder using an RS232 cable (similar to the one used to connect a modem).

If TFTP is used, The RouteFinder and configuration PC must be on the same segment of the network or on an IP internetwork.

Note: TFTP can be used only when the RouteFinder is up and has IP routing enabled.

Select Port

Setup utility needs one communication port to establish a link with the target's command port. This can be any of the standard COM ports on a PC.

Router IP Address

You need to enter the IP address of the router which you want to configure. This is needed only if you want to use TFTP.

Modem Setup Initialization String

Any modem specific initialization commands can be set in this field. This string is sent to the modem before dialing the target. Setup automatically appends a Carriage Return character to this string before it is sent to the modem.

Modem Setup Initialization Response String

In Response to an initialization command to the modem, the Setup utility will look for a response from the modem before it dials. If no response is received from the modem, no dialing will take place.

Dial String

Specify the dial command and phone number in this field. The setup utility can establish a link to the target through a dialup modem. The dial string typically is as follows:

ATDT<Phone Number>

Where <Phone Number> is the telephone number of the target. Setup automatically appends a Carriage return character to this string before it is send to the modem.

Note: If there is a non-empty dial string present, all setup programs (Router Configuration, Default Setup Download and Firmware Update) will try to initialize the modem and dial this string before looking for the presence of the router.

Modem Setup Connect Response String

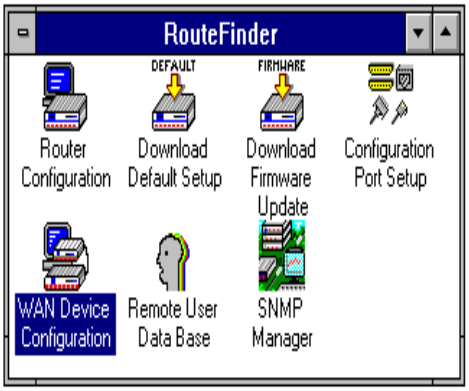
After dialing a number, Setup will wait for this string from the modem. In most cases you can set it to **CONNECT.**

Modem Setup Hangup String

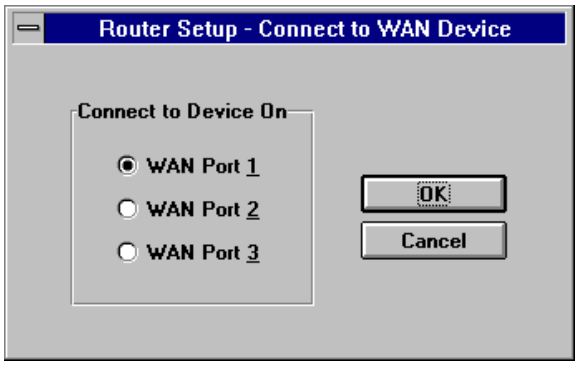
While exiting, the Setup utility checks to see if the DCD signal is present on the communication port. If DCD is present, it informs you and can optionally hangup the modem. Setup first tries to hangup the modem by resetting the DTR signal on the communication port. If DCD is present even after DTR is reset, Setup will try to send out the string specified in this field before actually exiting.

5.6 WAN Device Configuration

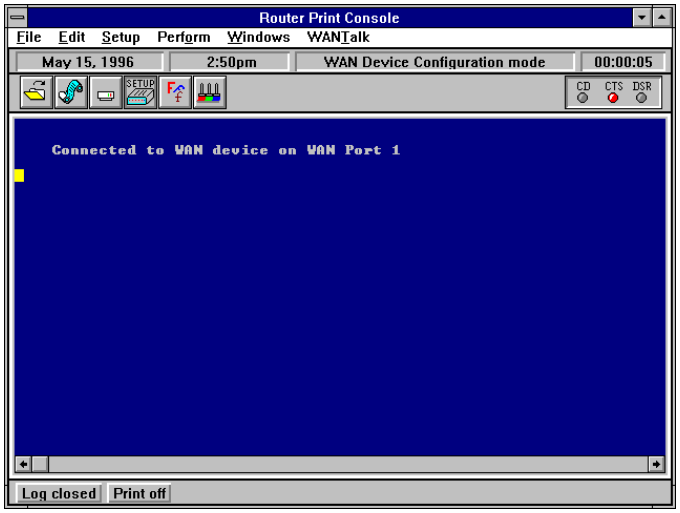
To add more commands than the Router Configuration icon can handle, double click on the WAN Device Configuration icon. The RouteFinder Print Console dialog box allows for an unlimited number of AT commands to be presented to a WAN device.



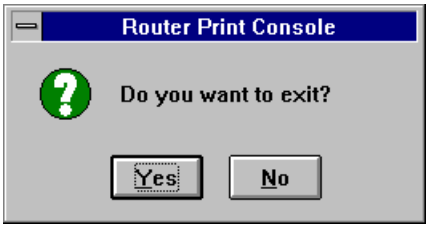
When the Connect to WAN Device dialog box appears, WAN port 1 is selected. Click on the WAN Port number check box for your WAN device. Click on the OK button.



The Print Console screen appears.



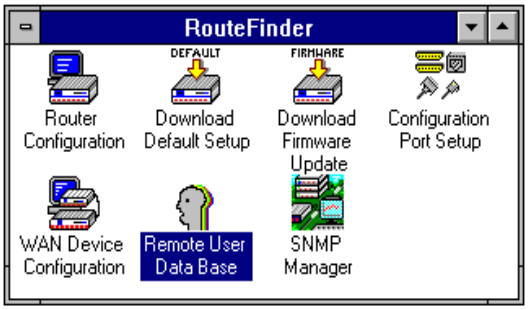
The Print Console menu allows you to enter AT commands in order to configure WAN device. Refer to your WAN device Owner's Manual to configure your device.



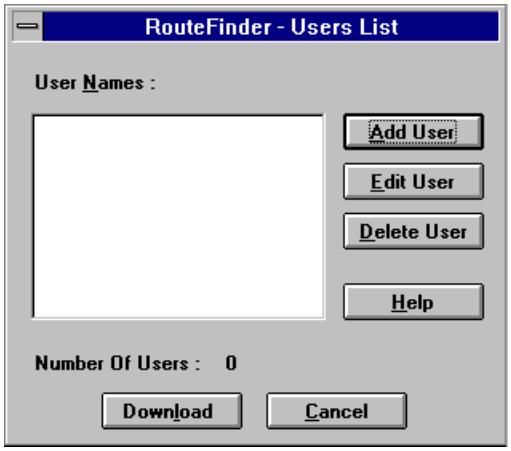
Click on File Exit and you are returned to the Program Manager.

5.7 Remote User Data Base

The Remote User Data Base icon lets you gather information about your remote users. You can add remote users, remove users from the data base, or you can edit information in the data base.



The User List displays a list of the current remote users. Users can be added to the list, deleted from the list, or certain information about a user can be edited.



Add User

The Add User button lets you add users to the data base.

Edit User

The Edit User button lets you edit the selected user information.

Delete User

The Delete User button lets you delete the selected user from the data base.

Download

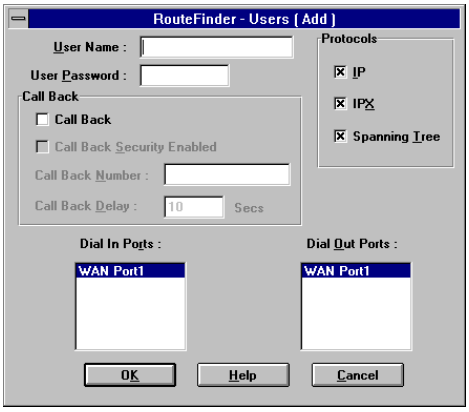
The Download button lets you down load the data base and then exit.

Cancel

The Cancel button allows you to exit without changing the data base.

5.7.1 Add User

The Add User dialog box lets you add user information such as user name, password, and callback information on each user in the data base.



User Name

The User Name can have as many as 39 characters. All printable characters are permitted with the restriction that a blank cannot appear in the user name. The user name is treated as a case insensitive string in a dial-in and dial-out applications.

User Password

The User Password can have as many as 7 characters. In places where the password is used as a character string, it is treated as a case insensitive string. Elsewhere (PPPs CHAP), it is treated as a case sensitive pattern.

Call Back Security Enabled

This parameter is of use in dial-in applications where the user is required to be called back at a specific location. Enabling this parameter results in having the administrator assigning the callback parameters. Disable this if the user is to be permitted to choose the callback number and callback delay.

Call Back Number

The callback number is editable only if callback security is enabled. This is the number where the user will be called back. The user **cannot** choose the location where he wants to be called back.

Call Back Delay

Call back delay is editable only if callback security is enabled. This specifies the duration after which the user will be called back at the administrator-assigned number.

Protocols

This lets you select the protocol(s) in which the user is allowed to dial into the RouteFinder.

Dial In Ports

This allows you to select the port over which the user is permitted to dial into the RouteFinder.

Dial Out Ports

This allows you to select the port over which the user is permitted to dial out from the RouteFinder.

RouteFinder 100™

Single WAN Multi-Protocol Router

Chapter 6 - Configuration Examples

MultiTech® Systems

6.1 Introduction

This chapter provides examples of how to configure your RouteFinder[100] for use in several operating environments. The configuration examples start out with a RouteFinder[100] connected to a LAN in Mounds View using IP protocol, an external terminal adapter with Basic Rate ISDN service, and either a dial up line or leased line to LAN 2 in Minneapolis with the same protocol and WAN device using the same ISDN service. Section 6-3 provides examples of a RouteFinder[100] connected to a LAN with a frame relay network providing multiple virtual connections to remote sites.

Section 6.2 provides examples of how the RouteFinder[100]s are configured for IP or IPX routing or bridging. The external communications device in our examples is a terminal adapter, but it could be a modem or DSU depending on the communications needs of the site. The communications device can also be connected to a dial-up or leased line.

Section 6.3 provides examples of how the RouteFinder[100]s are configured using frame relay as the communications medium between the local and remote sites. Usually the main site or in the configuration examples the Mounds View site is considered the main site which will be configured with two virtual circuits. One of the virtual circuits will connect the Mounds View site to the River Falls site. The second virtual circuit connects the Mounds View site to a Minneapolis site. An important consideration when configuring a frame relay nework is that the virtual WANs are on the same network and that no LANs have the same address.

6.2 Two RouteFinder[100]s with External TA

This example provides procedures for configuring two RouteFinder[100]s using IP protocol, external Terminal Adapters (TAs) with Basic Rate ISDN service, and either a dial or leased line network (see Figure 6-1).

One RouteFinder[100] is connected to the Mounds View LAN with a 10Base-T Ethernet connection, and an external Terminal Adapter provides the connection from the RouteFinder[100] to the ISDN service. The ISDN service is provided by the local telephone service which connects the Mounds View LAN to the Minneapolis LAN.

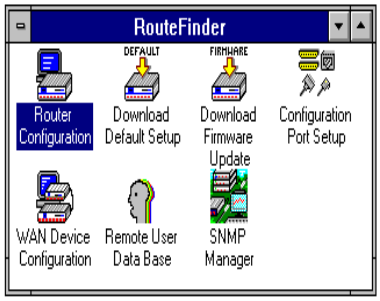
In this example, a PC is connected to the command port of each RouteFinder[100]. First the configuration for the Mounds View Operation is set and then the configuration for the Minneapolis Operation is set.

Figure 6-1. IP LAN with Terminal Adapter

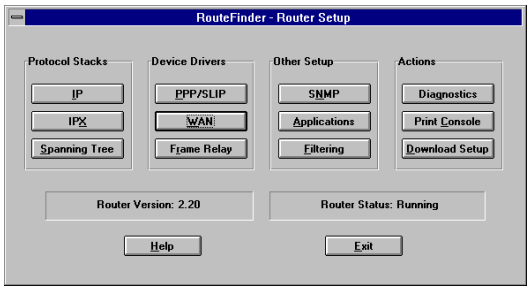
6.2.1 Setting Up the Mounds View Operation With IP Protocol

In this example, the Mounds View LAN is going to be configured with an Ethernet port IP address of 205.1.6.1. The WAN port will have an IP address of 205.1.7.1. The WAN port will be set for Answering mode in a dial-up configuration. The WAN device will be an external ISDN terminal adapter set up in either a Dial 115.2K Async mode of operation or a leased line synchronous mode of operation.

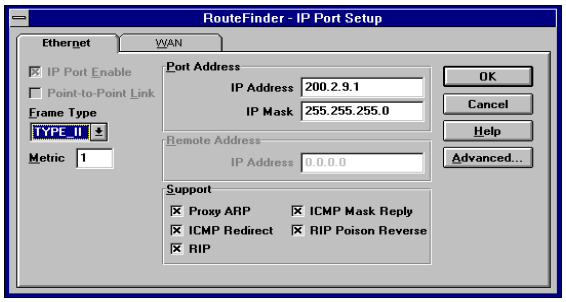
1. From the console PC, load Windows® and at the RouteFinder[100] Program Group, double click on the Router Configuration icon.



2. When the Router Setup dialog box is displayed, click on the **IP** button.

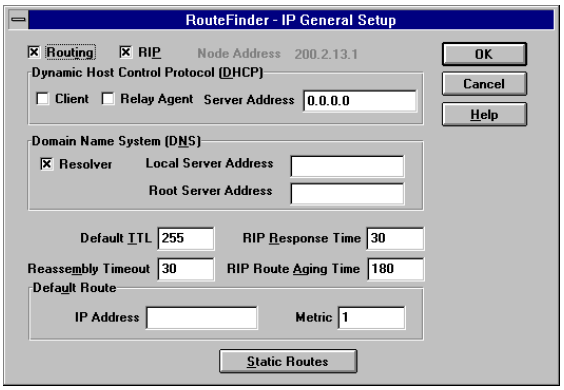


3. The IP Port Setup dialog box is displayed with the Ethernet tab highlighted and the default Ethernet Port IP Address displayed.



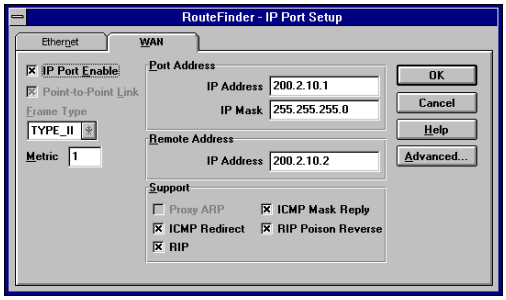
4. Change the default Port Address IP Address to **205.1.6.1**. To change the default IP Address, click on the Port Address IP Address text box and hit the backspace key. Enter **205.1.6.1**.

5. Click on the **Advanced** button and ensure that the IP Routing is enabled in the IP General Setup dialog box.



Click on the OK button to return to the IP Port Setup dialog box.

6. Click on the **WAN** tab.

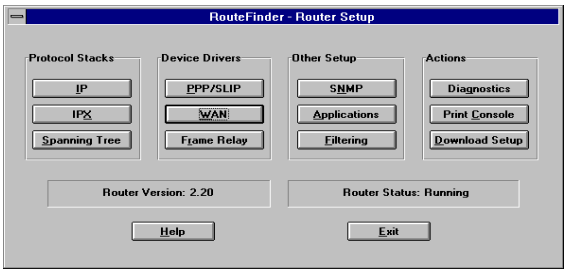


7. Change the default **WAN** Port IP Address by clicking on the Port Address IP Address text box and back spacing thru the default address. Enter **WAN** IP Address of **205.1.7.1**.

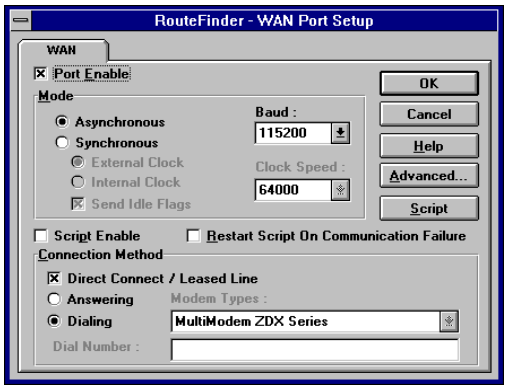
8. Change the default **Remote Address IP Address** by clicking on the Remote IP Address text box and backspacing thru the default IP address. Enter the Remote IP Address of **205.1.7.2**.

   Click on the **OK** button to return to the Router Setup dialog box.

9. In the Router Setup dialog box, click on the **WAN** button.



10. The WAN Port Setup dialog box is displayed with the Port Enabled, Mode set for Asynchronous, and the Connection Method set to Direct Connect/Leased LIne and Answering.



With a dial-up line and an async modem, the Mode needs to be Asynchronous (the default) and the Connection Method needs to be either Answering or Dialing. For the Mounds View site it needs to be Answering.

With a leased line, the Mode needs to be Synchronous and the Connection Method needs to be Direct Connect/Leased Line.

For a dial-up connection, perform steps 11,12,and 13 and then skip to step 15.

For a leased line connection, skip to step 14.

11. Change the connection method to **Answering** by clicking on the **Direct Connect/Leased Line** check box.

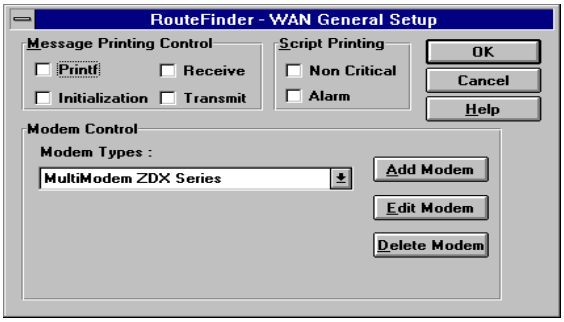
    For the Mounds View LAN, the WAN Port Setup dialog box should have the following fields checked:

    [X] Port Enable [X] Asynchronous

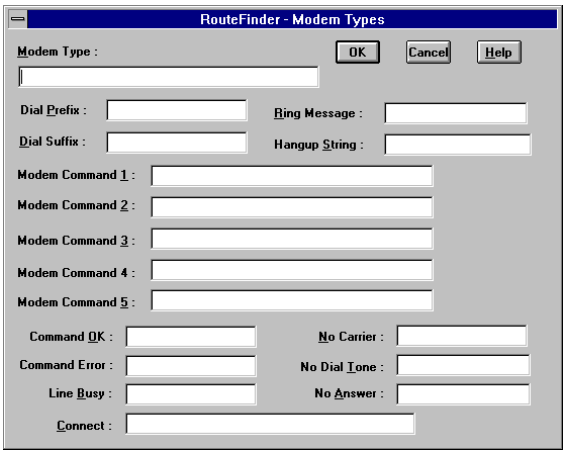
    [X] 115200

    [X] Answering

12. Click on the **Advanced** button to display the WAN General Setup dialog box.



13. Click on the **Modem Types** drop down text box and click on your modem type. If your WAN device is not listed in this text box, click on the **Add Modem** button to display the Modem Types dialog box.



At a minimum, you need to enter the type of WAN device connected to the WAN port (e.g., I-Way Hopper for the Multi-Tech's IDSN Terminal Adapter) in the **Modem Type** field. You also need to fill in the **Dial Prefix** field, e.g., ATDT, and the **Modem Command 1** field with an initialization string for your device, e.g., AT&F for the default configuation. Refer to the WAN device User Documentation for this information.

14. Click on **Synchronous** in the Mode check box. Then refer to the WAN Device User Documentation to determine whether the device can supply clocking or if it needs the clock produced by the RouteFinder^{100}. Click on the appropriate **Clock** check box and if Internal Clock is necessary, click on **Clock Speed** pull down list box and highlight the clock speed.

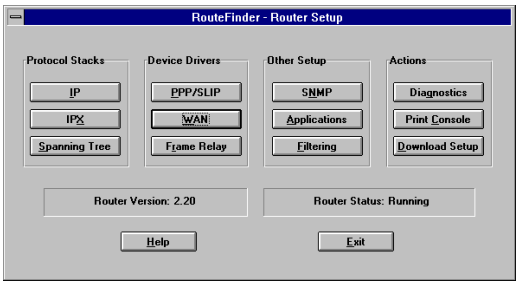
    For the Mounds View LAN, the WAN Port Setup dialog box should have the following fields checked:

    ☒ Port Enable ☒ Synchronous

    ☒ Internal Clock or External Clock (Clock Speed _____)

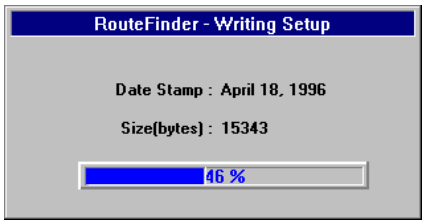
    ☒ Direct Connect/Leased Line

15. Click on the **OK** button to return to the Router Setup dialog box.

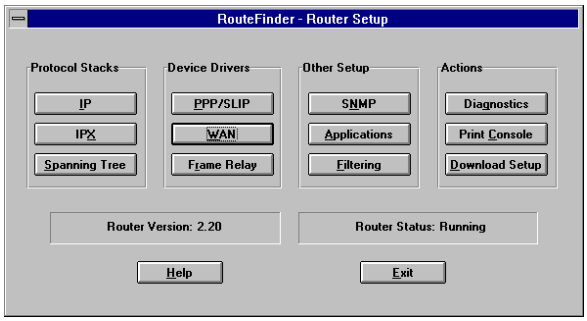


16. Click on the **Download Setup** button to change the configuration of the RouteFinder^{100}.

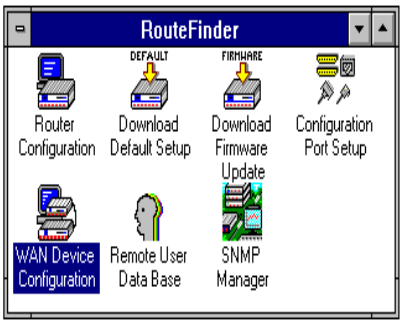
17. Click on the **OK** button to continue.



18. When the downloading is complete and the RouteFinder[100] has rebooted (FAIL LED is Off), the Router Setup dialog box is displayed with the Router Status showing Running.

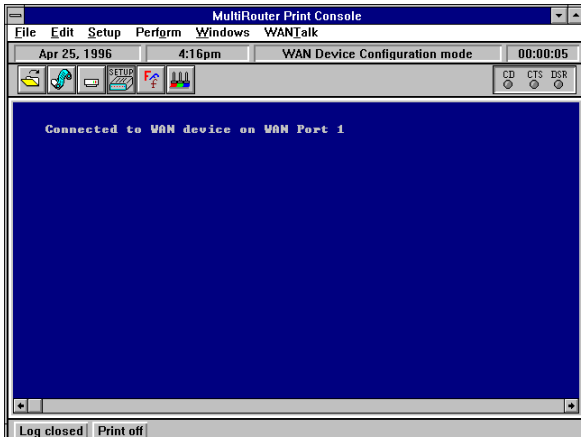


19. Click on the **Exit** button in the Router Setup dialog box to return to the Program Manager screen.



20. Double click on the **WAN Device Configuration** icon.

21. The Router Print Console menu is displayed, you can enter AT commands to configure the external ISDN TA.



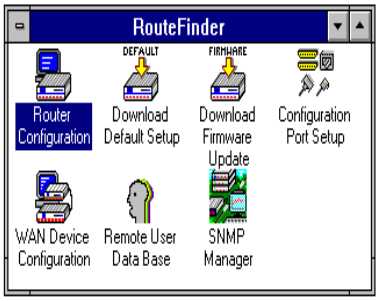
Refer to your WAN device User Documentation for configuration.

22. When your external ISDN TA is configured, click on **File** in the Tool Bar and then click on **Exit** in the dialog box.

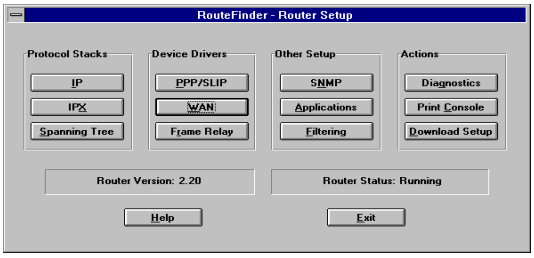
6.2.2 Setting up the Minneapolis Operation With IP Protocol

In this example, the Minneapolis LAN is going to be configured with an Ethernet port IP address of 205.1.8.1. The WAN port with an IP address of 205.1.7.2. The WAN port is also going to be set for dialing in the dial-up configuration. The WAN device will be an external ISDN terminal adapter set up in either a Dial 115.2K Async mode of operation or a leased line synchronous mode of operation.

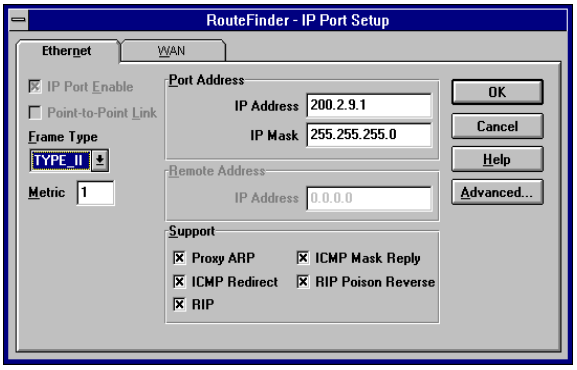
1. From the console PC, load Windows® and at the RouteFinder[100] Program Group, double click on the Router Configuration icon.



2. When the Router Setup Main Screen is displayed, click on the **IP** button.

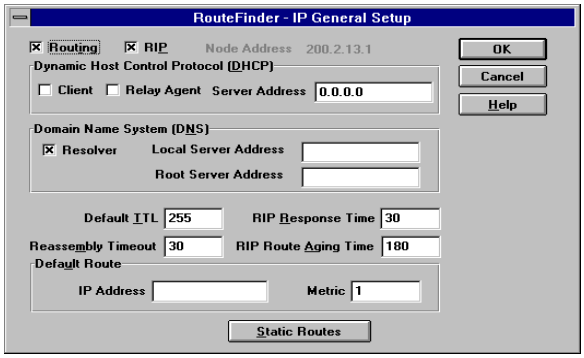


3. The IP Setup dialog box is displayed with the Ethernet tab highlighted and the default Ethernet Port IP Address displayed.

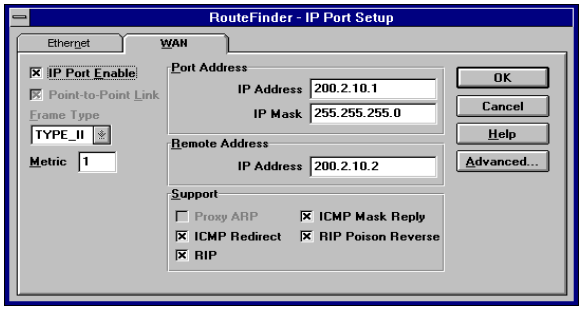


4. Change the default Port Address IP Address to **205.1.8.1**. To change the default IP Address, click on the Port Address IP Address text box and hit the backspace key. Enter **205.1.8.1**.

5. Click on the **Advanced** button to ensure that IP Routing is enabled in the IP General Setup dialog box.



6. Click on the **WAN** tab.

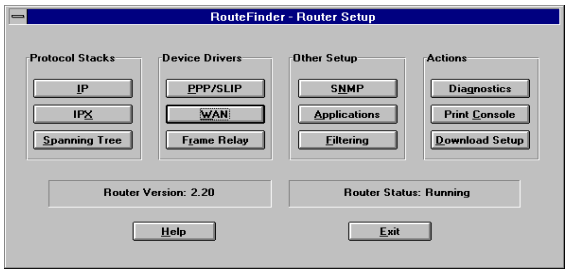


7. Change the default **WAN** Port IP Address by clicking on the Port Address IP Address text box and back spacing thru the default address. Enter **WAN** IP Address of **205.1.7.2**.

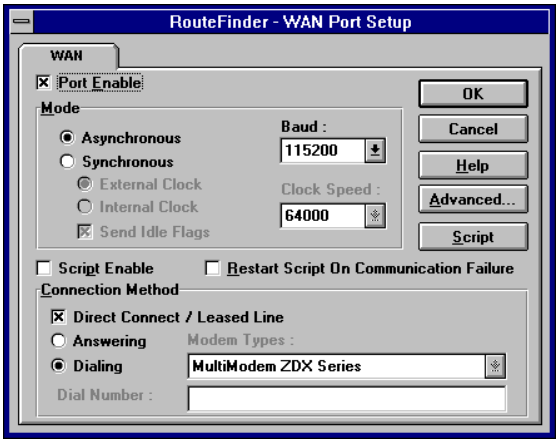
8. Change the default **Remote Address IP Address** by clicking on the Remote IP Address text box and backspacing thru the default IP address. Enter the Remote IP Address of **205.1.7.1**.

   Click on the **OK** button to return to the Router Setup dialog box.

9. In the Router Setup dialog box, click on the **WAN** button.



10. The WAN Port Setup dialog box is displayed with the Port Enabled, Mode set for Asynchronous, and the Connection Method set to Direct Connect/Leased LIne and Answering.



With a dial-up line and an async modem, the Mode needs to be Asynchronous (the default) and the Connection Method needs to be either Answering or Dialing. For the Minneapolis site it needs to be Dialing.

With a leased line, the Mode needs to be Synchronous and the Connection Method needs to be Direct Connect/Leased Line.

For a dial-up connection, perform steps 10,11,and 12 and then skip to step 14.

For a leased line connection, skip to step 13.

11. Change the connection method to **Dialing** by clicking on the **Direct Connect/Leased Line** check box.

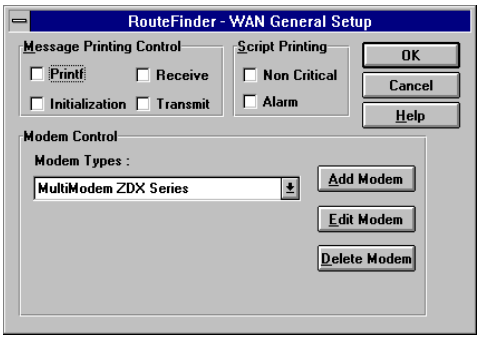
    For the Minneapolis LAN, the WAN Port Setup dialog box should have the following fields checked:

    ☒ Port Enable ☒ Asynchronous

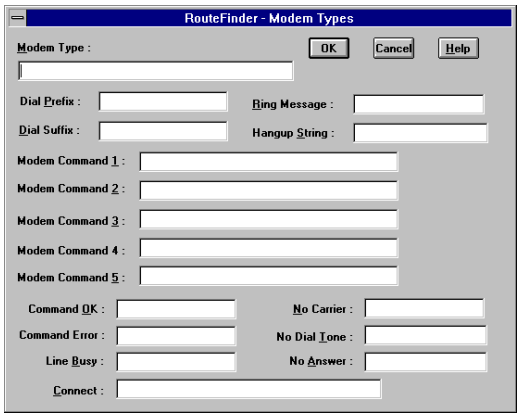
    ☒ 115200 ☒ Dialing

    Ensure that the Modem Init String and the Modem Dial String for the external ISDN TA are entered correctly. Refer to the WAN device User Documentation for the strings.

12. Click on the **Advanced** button to display the WAN General Setup dialog box.



13. Click on the **Modem Types** drop down text box and click on your modem type. If your WAN device is not listed in this text box, click on the Add Modem button to display the **Modem Types** dialog box.



At a minimum, you need to enter the type of WAN device connected to the WAN port (e.g., I-Way Hopper for the Multi-Tech's ISDN Terminal Adapter) in the **Modem Types** field. You also need to fill in the **Dial Prefix** field, e.g., ATDT, and then the **Modem Command 1** field with an initialization string for your WAN device, e.g., AT&F for the default configuration. Refer to the WAN device User Documentation for this information.

14. Click on **Synchronous** in the Mode check box. Then refer to the WAN Device User Documentation to determine whether the device can supply clocking or if it needs the clock produced by the RouteFinder[100]. Click on the appropriate **Clock** check box and if Internal Clock is necessary, click on **Clock Speed** pull down list box and highlight the clock speed.

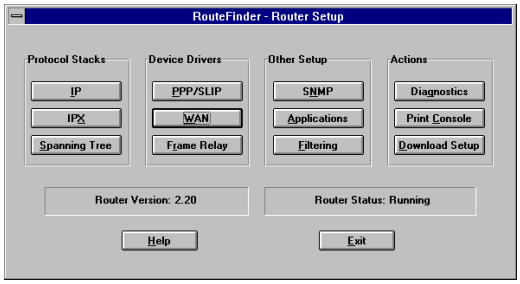
    For the Minneapolis LAN, the WAN Port Setup dialog box should have the following fields checked:

    [X] Port Enable [X] Synchronous

    [X] Internal Clock or External Clock (Clock Speed _____)

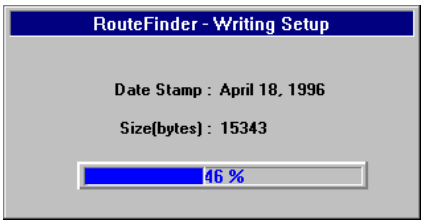
    [X] Direct Connect/Leased Line

15. Click on the **OK** button to return to the Router Setup dialog box.

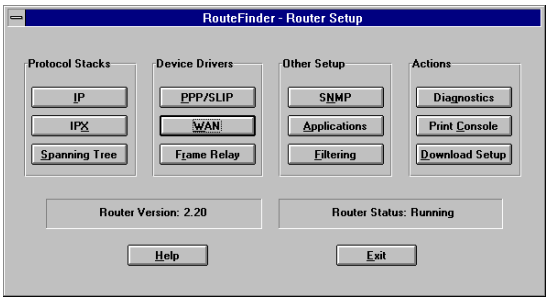


16. Click on the **Download Setup** button to change the configuration of the RouteFinder[100].

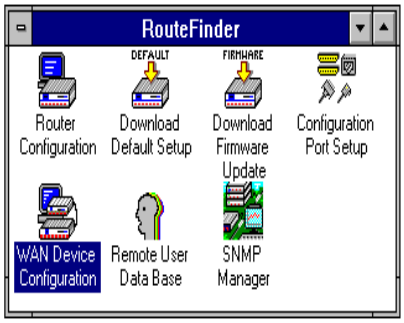
17. Click on the **OK** button to continue.



18. When the downloading is complete and the RouteFinder[100] has rebooted (FAIL LED is Off), the Router Setup dialog box is displayed with the Router Status showing Running.

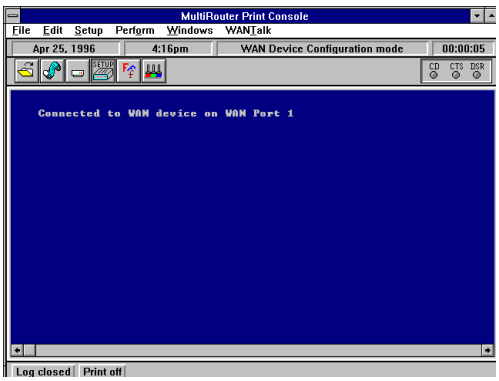


19. Click on the **Exit** button in the Router Setup dialog box, to return to the Program Manager screen.



20. Double click on the **WAN Device Configuration** icon.

21. The Router Print Console menu is displayed, you can enter AT commands to configure the external ISDN TA.



Refer to your WAN device User Documentation for configuration.

22. When your external ISDN TA is configured, click on **File** in the Tool Bar and then click on **Exit** in the dialog box.

6.2.3 Setting Up the Mounds View Operation With IPX Protocol

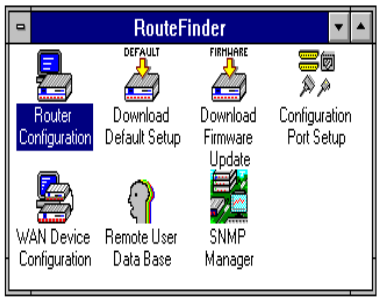
In this example, the Mounds View LAN is going to be configured using IPX protocol, external Terminal Adapters (TAs) with Basic Rate ISDN service, and either a dial or leased line network (Figure 6-2). The Mounds View LAN is installed with the default Auto Learn enabled. The Chicago LAN is connected to the file server on the Mounds View LAN and therefore is installed with unique network numbers. The unique network numbers have to be manually entered for each frame type.

Figure 6-2. IPX LAN with Terminal Adapter

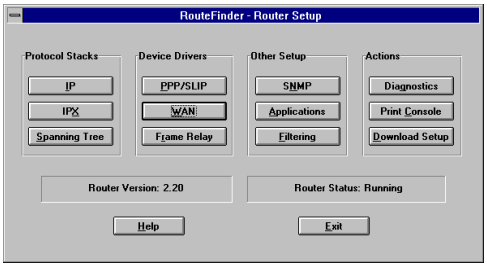
One RouteFinder[100] is connected to the Mounds View LAN with a 10Base-T Ethernet connection, an external terminal adapter provides the connection from the RouteFinder[100] to the ISDN service. The ISDN service is provided by the local telephone service which connects the Mounds View LAN to the Chicago LAN.

In this example, a PC is connected to the command port of each RouteFinder[100]. First the configuration of the Mounds View Operation is set and then the configuration of the Chicago LAN is set.

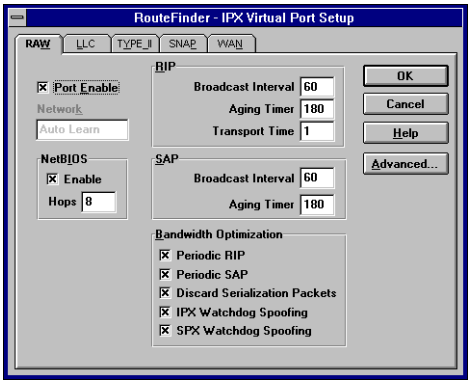
1. From the console PC, load Windows® and at the RouteFinder[100] Program Group, double click on the Router Configuration icon.



2. When the Router Setup Main Screen is displayed, click on the **IPX** button.

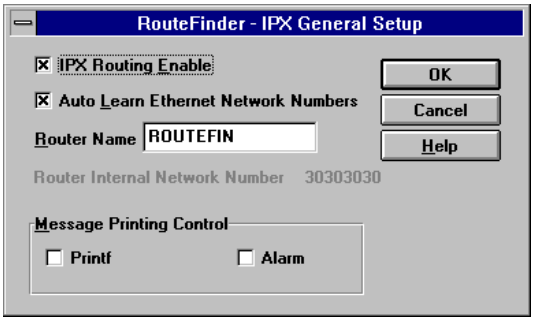


3. The IPX Virtual Port Setup dialog box is displayed with the RAW tab highlighted.



4. It is recommended that a RouteFinder[100] connected to a file server on a LAN leave the default **Auto Learn** enabled for all the frame types, except the WAN ports. Verify that each frame type has the Network text box displaying Auto Learn.

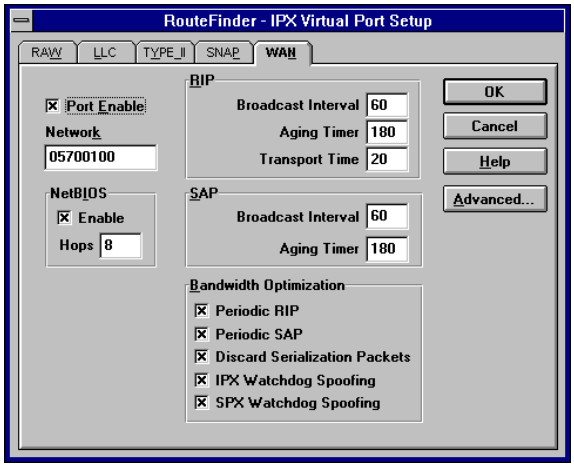
5. Click on the **Advanced** button and verify that Port Enable check box is active in the IPX General Setup dialog box and that **Auto Learn** is active.



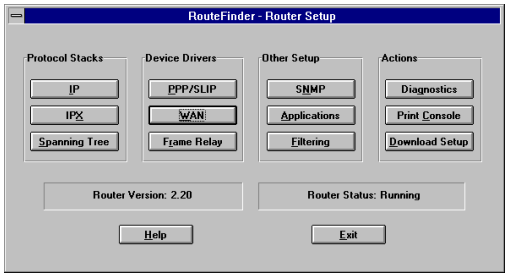
Click on the **Router Name** text box and back space through the default name and enter **Mounds_View**. Click on **OK** button to return to the IPX Virtual Port Setup dialog box.

6. Click on the **WAN** tab and change the default **Network number** to **11113456**.

To change the network number, click on the Network plain box and back space through the default network number and enter your 8-digit network number (11113456).

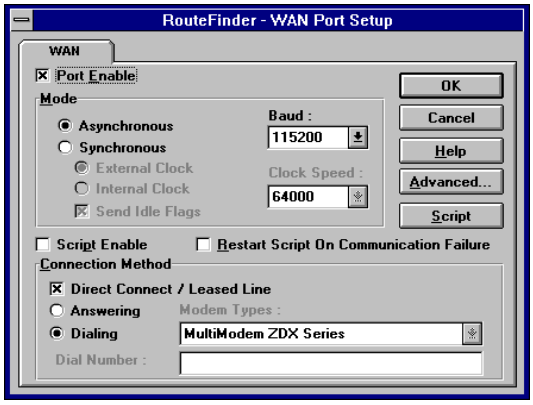


7. Click on the **OK** button when you are satisfied with your selection.
8. The Router Setup dialog box is displayed.



In the Router Setup dialog box click on the **WAN** button.

9. The WAN Port Setup dialog box is displayed with the Port Enabled, Mode set for Asynchronous, and the Connection Method set to Direct Connect/Leased Line and Answering.



With a dial-up line and an async modem, the Mode needs to be Asynchronous (the default) and the Connection Method needs to be either Answering or Dialing. For the Mounds View site it needs to be Answering.

With a leased line, the Mode needs to be Synchronous and the Connection Method needs to be Direct Connect/Leased Line.

For a dial-up connection, perform steps 10,11, and 12 and then skip to step 14.

For a leased line connection, skip to step 13.

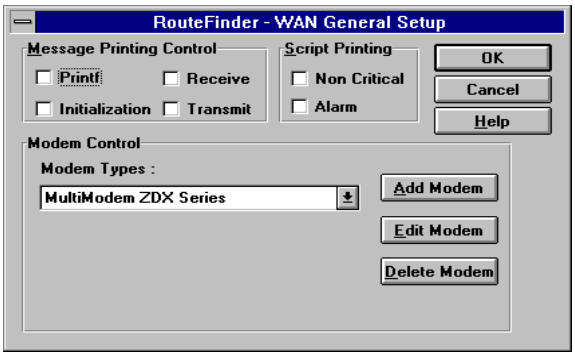
10. Change the Connection Method to **Answering** by clicking on the **Direct Connect/Leased Line** check box.

    For the Mounds View LAN, the WAN Port Setup dialog box should have the following fields checked:

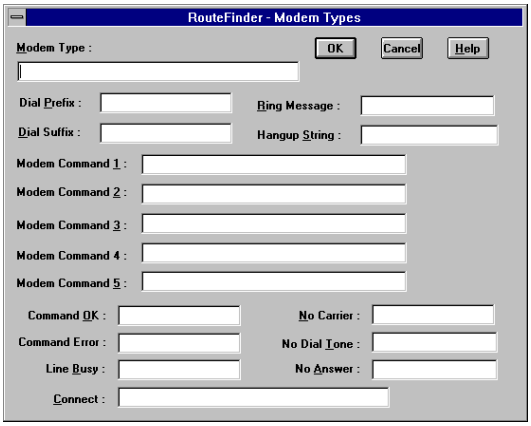
    ☒ Port Enable ☒ Asynchronous

    ☒ 115200 ☒ Answering

11. Click on the **Advanced** button to display the WAN General Setup dialog box.



12. Click on the **Modem Types** drop down text box and click on your modem type. If your WAN device is not listed in this text box, click on the **Add Modem** botton to display the Modem Types dialog box.



    At a minumum, you need to enter the type of WAN device connected to the WAN port (e.g., I-Way Hopper for the Multi-Tech's ISDN Terminal Adapter) in the **Modem Type** field. You also need to fill in the **Dial Prefix** field, e.g., ADTD, and the **Modem Command 1** field with an initialization string for your device, e.g., AT&F for the default configuration. Refer to the WAN device User Documentation for this information.

13. Click on **Synchronous** in the Mode check box. Then refer to the WAN Device User Documentation to determine whether the device can supply clocking or if it needs the clock produced by the RouteFinder[100]. Click on the appropriate **Clock** check box and if Internal Clock is necessary, click on **Clock Speed** pull down list box and highlight the clock speed.

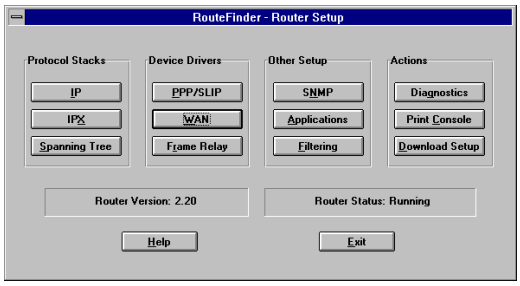
    For the Mounds View LAN, the WAN Port Setup dialog box should have the following fields checked:

    ☒ Port Enable ☒ Synchronous

    ☒ Internal Clock or External Clock (Clock Speed _____)

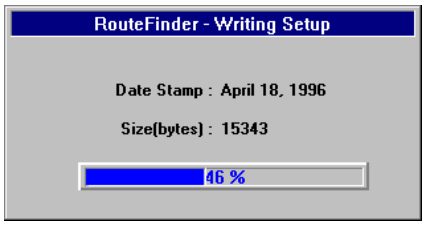
    ☒ Direct Connect/Leased Line

14. Click on the **OK** button to return to the Router Setup dialog box.

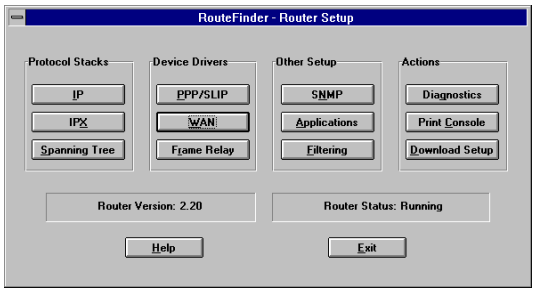


15. Click on the **Download Setup** button to change the configuration of the RouteFinder[100].

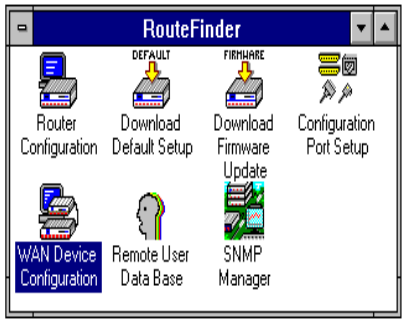
16. Click on the **OK** button to continue.



17. When the downloading is complete and the RouteFinder[100] has rebooted (FAIL LED is Off), the Router Setup dialog box is displayed with the Router Status showing Running.

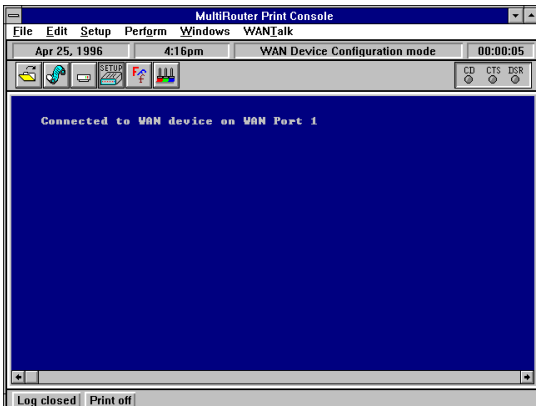


18. Click on the **Exit** button in the Router Setup dialog box, to return to the Program Manager screen.



19. Double click on the **WAN Device Configuration** icon.

20. The Router Print Console menu is displayed, you can enter AT commands to configure the external ISDN TA.



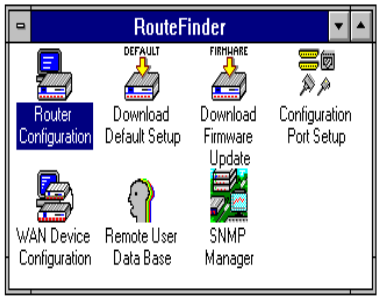
Refer to your WAN device User Documentation for configuration.

21. When your external ISDN TA is configured, click on **File** in the Tool Bar and then click on **Exit** in the dialog box.

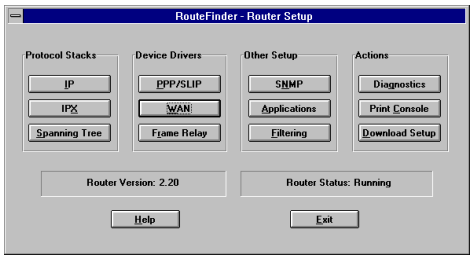
6.2.4 Setting up the Chicago Operation With IPX Protocol

In this example, the Chicago LAN is going to be configured with unique network numbers for each frame type. All frames are enabled. Each frame type in this example has a network number assigned in Figure 6-2.

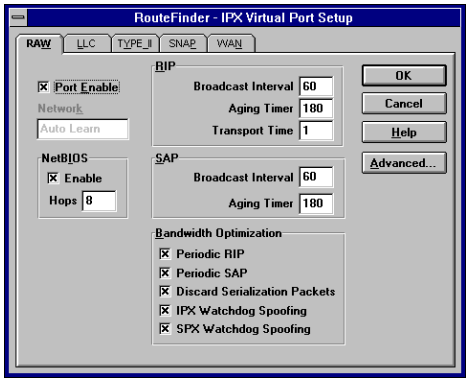
1. From the console PC, load Windows® and at the RouteFinder[100] Program Group, double click on the Router Configuration icon.



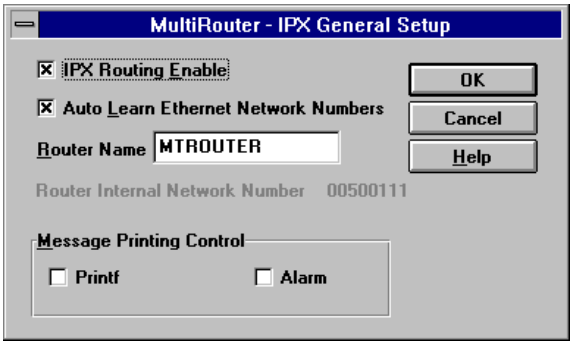
2. When the Router Setup Main Screen is displayed, click on the **IPX** button.



3. The IPX Virtual Port Setup dialog box is displayed with the **RAW** tab highlighted.



4. Click on the **Advanced** button and when the IPX General Setup dialog box is displayed, click on the **Auto Learn Ethernet Network Numbers** check box to disable Auto Learn.



5. Click on **Router Name** text box and back space through the default name and enter **Chicago**.

   If the Chicago LAN had a file server, then Auto Learn Ethernet Network Numbers would have to be active.

6. Click on the **OK** button to return to the RAW frame type.

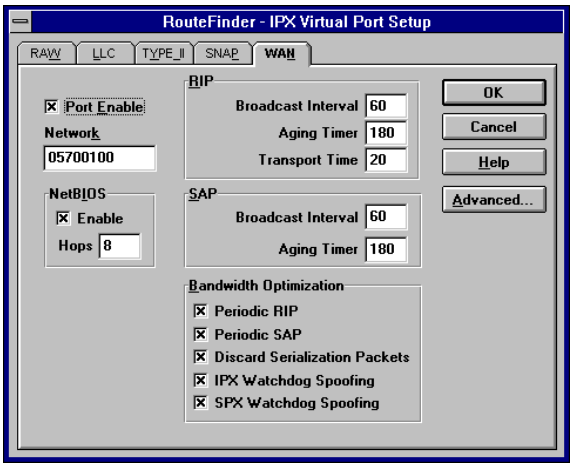
7. Change the default **Network** number for the **RAW** frame type to **02123456**. To change the Network number, click on the Network Plain box and back space through the default network number and enter your 8-digit network number (**02123456**).

8. Repeat step 7 for the following frame types:

   Change the default Network number for **LCC** frame type to **03123456**. Change the **TYPE II** frame type to **04123456**. Change the **SNAP** frame type to **05123456**.

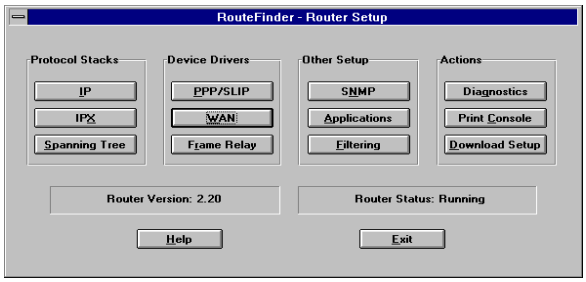
9. Click on the **WAN** tab and change the default Network number to **11113456**.

   To change the network number, click on the Network plain box and back space through the default network number and enter your 8-digit network number (11113456).



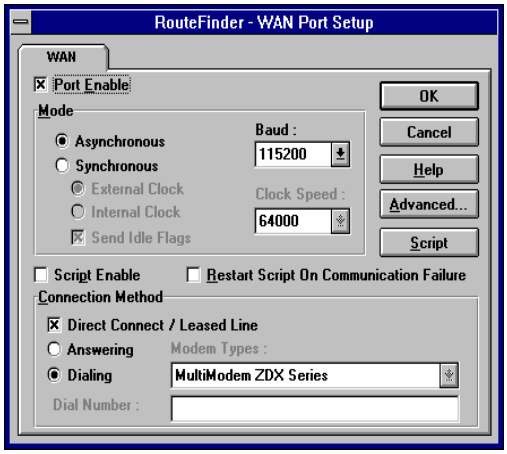
10. Click on the **OK** button when you are satisfied with your selection.

11. The RouteFinder[100] Setup dialog box is displayed.



In the RouteFinder[100] Setup dialog box click on the **WAN** button.

12. The WAN Port Setup dialog box is displayed with the Port Enabled, Mode set for Asynchronous, and the Connection Method set to Direct Connect/Leased Line and Answering.



With a dial-up line and an async modem, the Mode needs to be Asynchronous (the default) and the Connection Method needs to be either Answering or Dialing. For the Chicago site it needs to be Dialing.

With a leased line, the Mode needs to be Synchronous and the Connection Method needs to be Direct Connect/Leased Line.

For a dial-up connection, perform steps 13,14,and 15 and then skip to step 17.

For a leased line connection, skip to step 16.

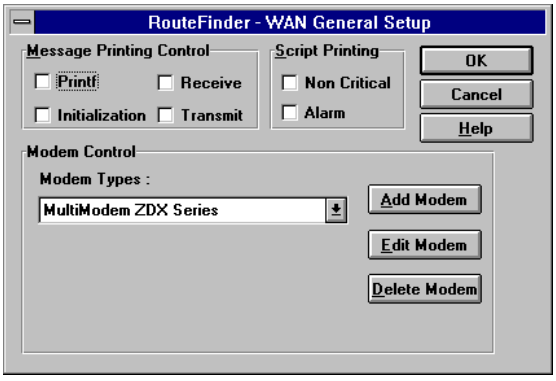
13. Change the Connection Method to **Dialup** by clicking on the **Dialing** check box.

For the Chicago LAN, the WAN Port Setup dialog box should have the following fields checked:

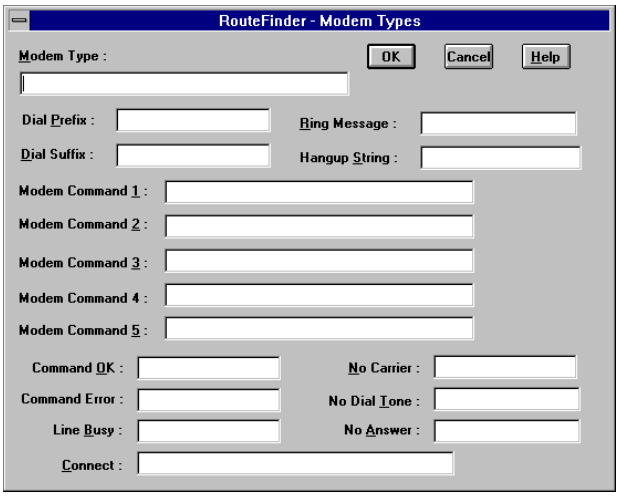
☒ Port Enable ☒ Asynchronous

☒ 115200 ☒ Dialing

14. Click on the **Advanced** button to display the WAN General Setup dialog box.



15. Click on the **Modem Types** drop down text box and click on your modem type. If you WAN device is not listed in this text box, click on the **Add Modem** button to display the Modem Types dialog box.



At a minimum, you need to enter the type of WAN device connected to the WAN port 1 (e.g., I-Way Hopper for the Multi-Tech's ISDN Terminal Adapter) in the **Modem Type** field. You also need to fill in the **Dial Prefix** field, e.g., ADTD, and the **Modem Command 1** field with an initialization string for your device, e.g, AT&F for the default configuration. Refer to the WAN device User Documentation for this information.

16. Click on **Synchronous** in the Mode check box. Then refer to the WAN Device User Documentation to determine whether the device can supply clocking or if it needs the clock produced by the RouteFinder[100]. Click on the appropriate **Clock** check box and if Internal Clock is necessary, click on **Clock Speed** pull down list box and highlight the clock speed.

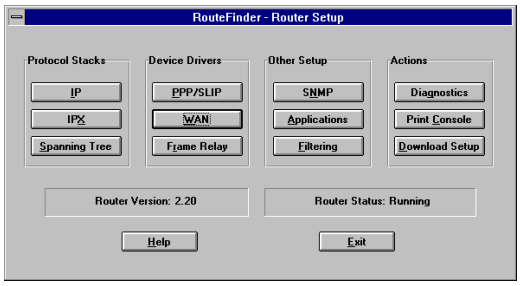
    For the Chicago LAN, the WAN Port Setup dialog box should have the following fields checked:

    ☒ Port Enable ☒ Synchronous

    ☒ Internal Clock or External Clock (Clock Speed _____)

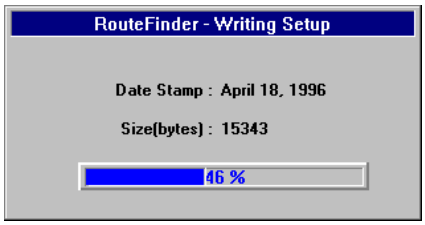
    ☒ Direct Connect/Leased Line

17. Click on the **OK** button to return to the Router Setup dialog box.

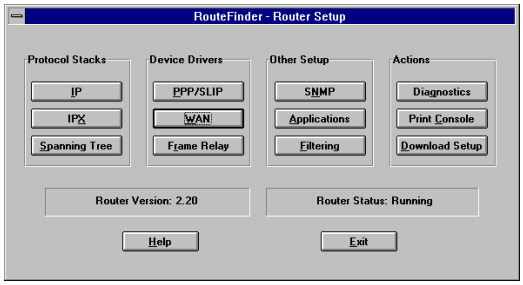


18. Click on the **Download Setup** button to change the configuration of the RouteFinder[100].

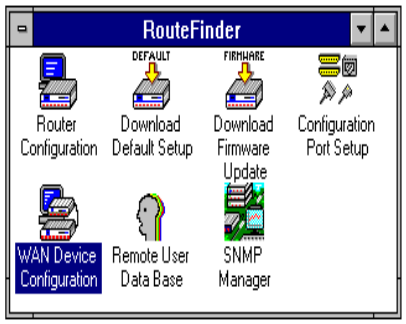
19. Click on the **OK** button to continue.



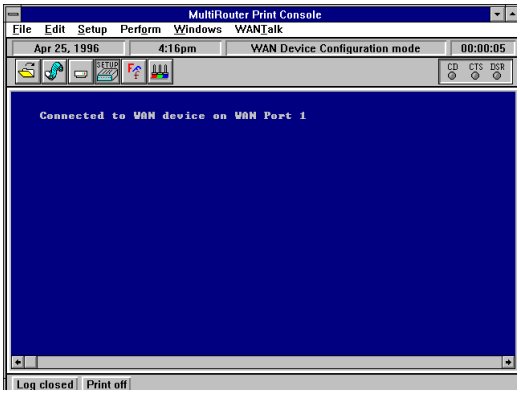
20. When the downloading is complete and the RouteFinder[100] has rebooted (FAIL LED is Off), the Router Setup dialog box is displayed with the Router Status showing Running.



21. Click on the **Exit** button in the Router Setup dialog box, to return to the Program Manager screen.



22. Double click on the **WAN Device Configuration** icon.
23. The Router Print Console menu is displayed, you can enter AT commands to configure the external ISDN TA.



Refer to your WAN device User Documentation for configuration.

24. When your external ISDN TA is configured, click on **File** in the Tool Bar and then click on **Exit** in the dialog box.

6.2.5 Setting Up the Mounds View Operation for Bridging

Bridging is enabled for nonIP or IPX networks. When bridging is enabled, IP, IPX, and SNMP should be disabled to increase efficiency. Spanning Tree Bridging is used to support networking protocols like NetBIOS.

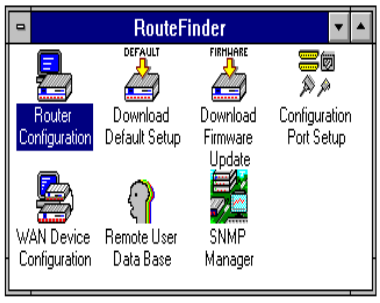
This example provides procedures for configuring two RouteFinder[100]s for bridging using external Terminal Adapters (TAs)with Basic Rate ISDN service and either a dial or leased line network (Figure 6-3).

Figure 6-3. Bridging with Terminal Adapters

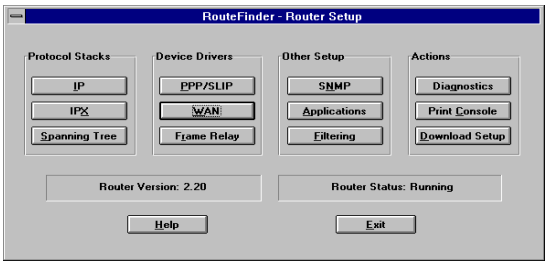
One RouteFinder[100] is connected to the Mounds View LAN with a 10Base-T Ethernet connection, an external terminal adapter provides the connection from the RouteFinder[100] to the ISDN service. The ISDN service is provided by the local telephone service which connects the Mounds View LAN to the St Louis LAN.

In this example, a PC is connected to the command port of each RouteFinder[100]. First the configuration of the Mounds View Operation is set and then the configuration of the St Louis LAN is set.

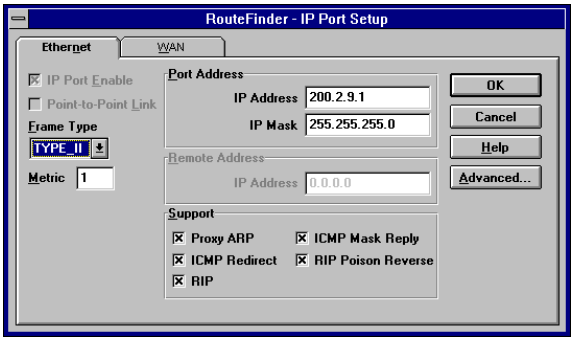
1. From the console PC, load Windows® and at the RouteFinder[100] Program Group, double click on the Router Configuration icon.



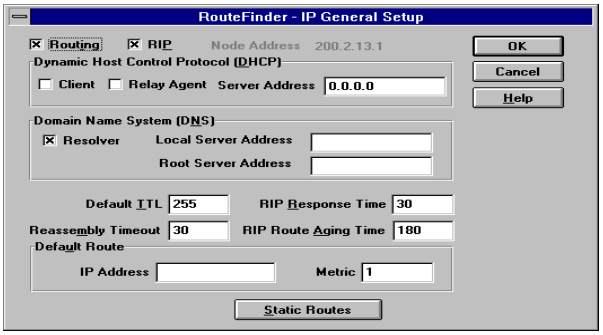
2. When the Router Setup Main Screen is displayed, click on the **IP** button.



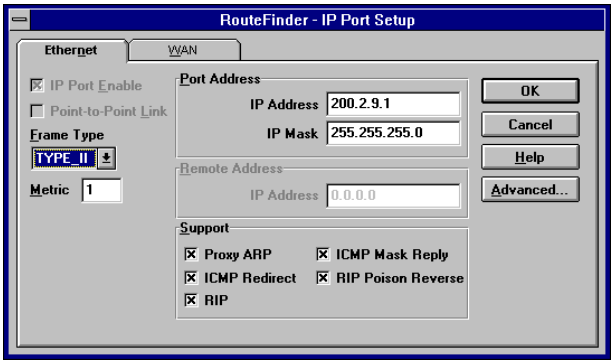
3. In the IP Port Setup dialog box, click on the **Advanced** button.



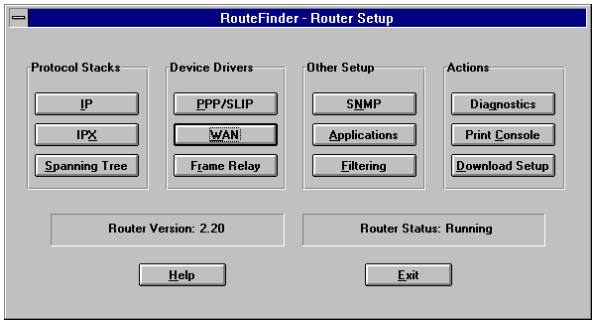
4. In the IP General Setup dialog box, click on the **IP Routing Enable** check box to disable the IP Routing.



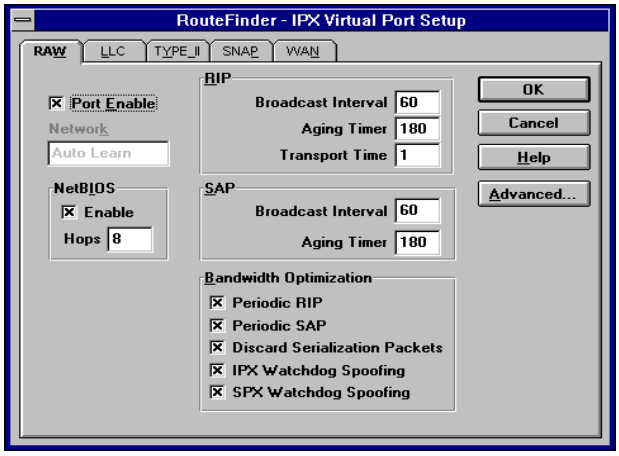
5. Click on **OK** to return to the IP Port Setup dialog box.



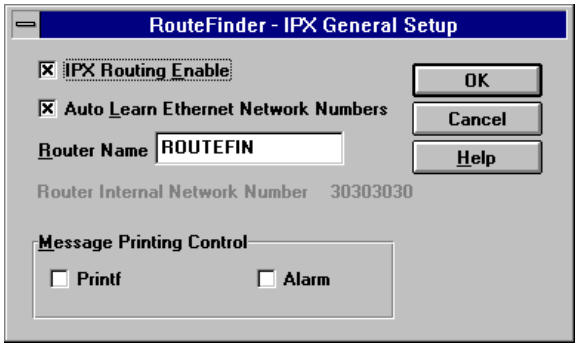
6. Click on **OK** to return to the Router Setup dialog box.



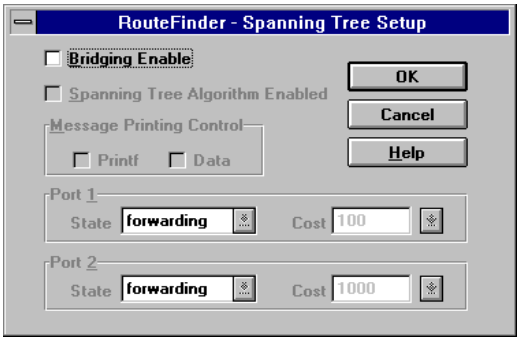
7. In the Router Setup dialog box, click on the **IPX** button.



8. In the IPX Virtual Port Setup dialog box, click on the **Advanced** button to display the IPX General Setup dialog box.

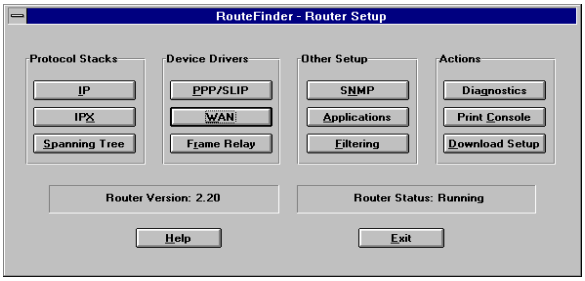


9. In the IPX General dialog box, click on the **IPX Routing Enable** check box to disable the IPX routing. Then, click on the **OK** button to return to the IPX Virtual Port Setup dialog box.
10. Click on the **OK** button in the IPX Virtual Port Setup dialog box to return to the Router Setup dialog box.
11. In the Router Setup dialog box, click on the **Spanning Tree** button. The Spanning Tree dialog box is displayed.



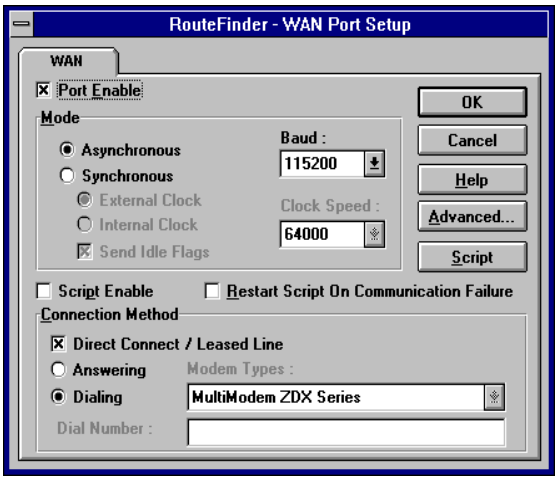
12. Ensure that **Bridging** and **Spanning Tree Algorithm Enable** check boxes are enabled and that Ports 1 and 2 display **forwarding**.

    Click on the **OK** button when you are satisfied with your selection. The Router Setup dialog box is displayed.



13. In the RouteFinder[100] Setup dialog box click on the **WAN** button.

14. The WAN Port Setup dialog box is displayed with the Port Enabled, Mode set for Asynchronous, and the Connection Method set to Direct Connect/Leased Line and Answering.



With a dial-up line and an async modem, the Mode needs to be Asynchronous (the default) and the Connection Method needs to be either Answering or Dialing. For the Mounds View site it needs to be Answering.

With a leased line, the Mode needs to be Synchronous and the Connection Method needs to be Direct Connect/Leased Line.

For a dial-up connection, perform steps 15,16, and 17 and then skip to step 19.

For a leased line connection, skip to step 18.

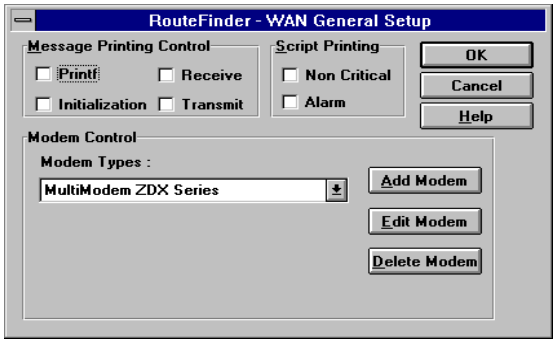
15. Change the Connection Method **Answering** by clicking on the **Direct Connect/Leased Line** check box.

    For the Mounds View LAN, the WAN Port Setup dialog box should have the following fields checked:

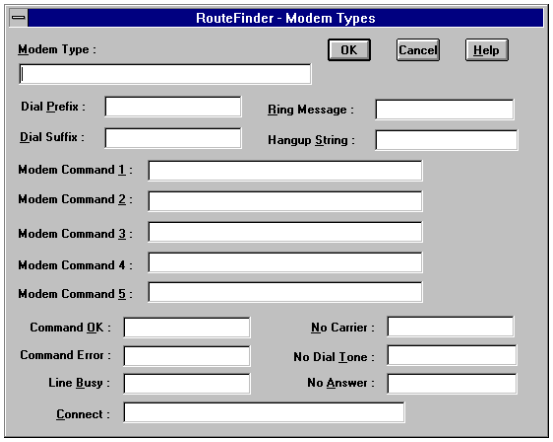
    [X] Port Enable [X] Asynchronous

    [X] 115200 [X] Answering

16. Click on the **Advanced** button to display the WAN General Setup dialog box.



17. Click on the **Modem Types** drop down text box and click on your modem type. If your WAN device is not listed in this text box, click on the **Add Modem** button to display the Modem Types dialog box.



    At a minimum, you need to enter the type of WAN device connected to the WAN port (e.g., I-WAy Hopper for the Multi-Tech's ISDN Terminal Adapter) in the **Modem Type** field. You also need to fill in the **Dial Prefix** field, e.g., ATDT, and the **Modem Command 1** field with an initialization string for your device, e.g., AT&F for the default configuration. Refer to the WAN device User Documentation for this information.

18. Click on **Synchronous** in the Mode check box. Then refer to the WAN Device User Documentation to determine whether the device can supply clocking or if it needs the clock produced by the RouteFinder[100]. Click on the appropriate **Clock** check box and if Internal Clock is necessary, click on **Clock Speed** pull down list box and highlight the clock speed.

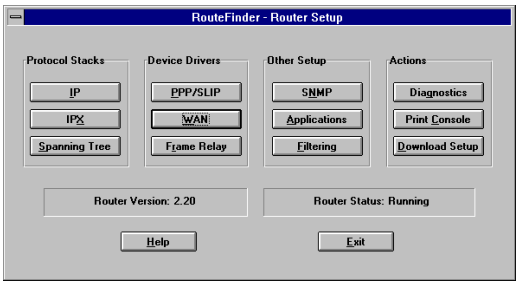
    For the Mounds View LAN, the WAN Port Setup dialog box should have the following fields checked:

    [X] Port Enable [X] Synchronous

    [X] Internal Clock or External Clock (Clock Speed _____)

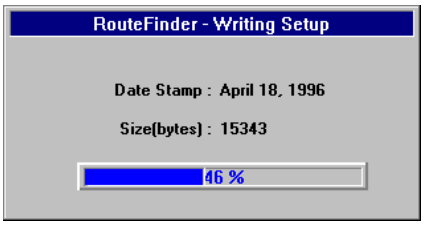
    [X] Direct Connect/Leased Line

19. Click on the **OK** button to return to the Router Setup dialog box.

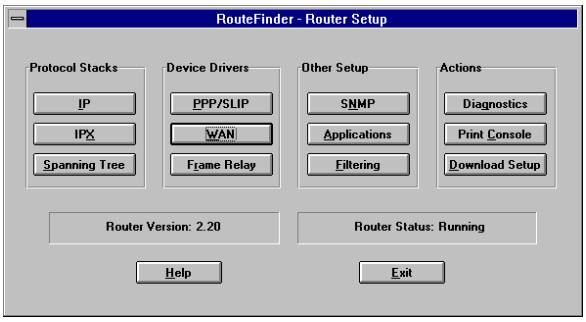


20. Click on the **Download Setup** button to change the configuration of the RouteFinder[100].

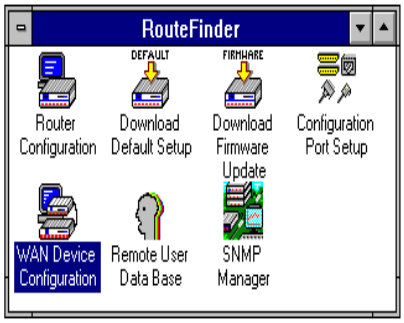
21. Click on the **OK** button to continue.



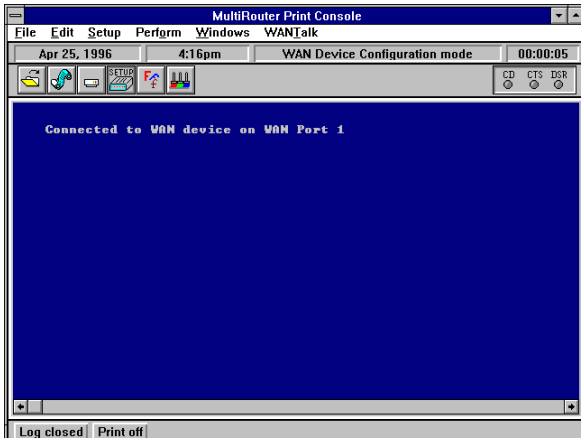
22. When the downloading is complete and the RouteFinder[100] has rebooted (FAIL LED is Off), the Router Setup dialog box is displayed with the Router Status showing Running.



23. Click on the **Exit** button in the Router Setup dialog box to return to the Program Manager screen.



24. Double click on the **WAN Device Configuration** icon.
25. The Router Print Console menu is displayed, you can enter AT commands to configure the external ISDN TA.



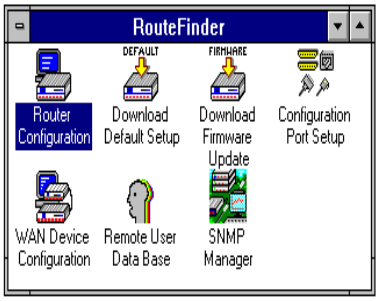
Refer to your WAN device User Documentation for configuration.

26. When your external ISDN TA is configured, click on **File** in the Tool Bar and then click on **Exit** in the dialog box.

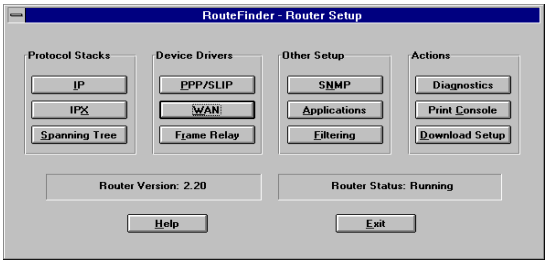
6.2.6 Setting up St. Louis Operation for Bridging

Spanning Tree Bridging is used to support networking protocols like NetBIOS. In this example, the St. Louis LAN is bridging nonIP and IPX protocols to the Mounds View LAN using an external ISDN terminal adapter set up in either a Dial 115.2K Async mode or a 128K Sync mode with a leased line.

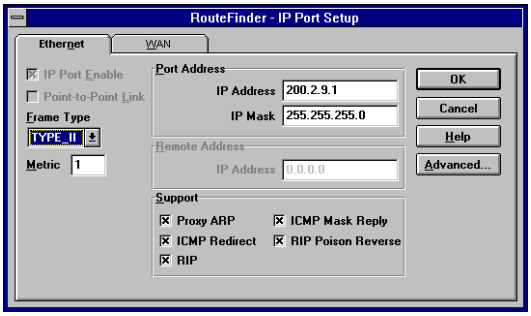
1. From the console PC, load Windows® and at the RouteFinder[100] Program Group, double click on the Router Configuration icon.



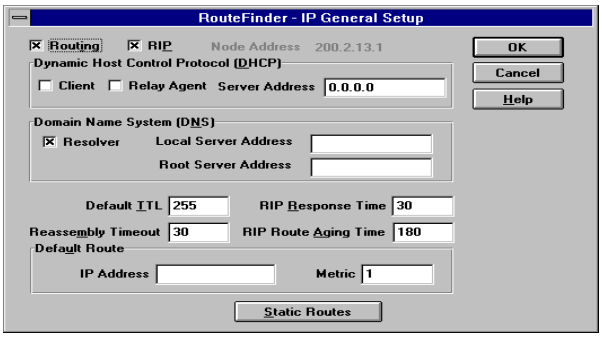
2. When the Router Setup Main Screen is displayed, click on the **IP** button.



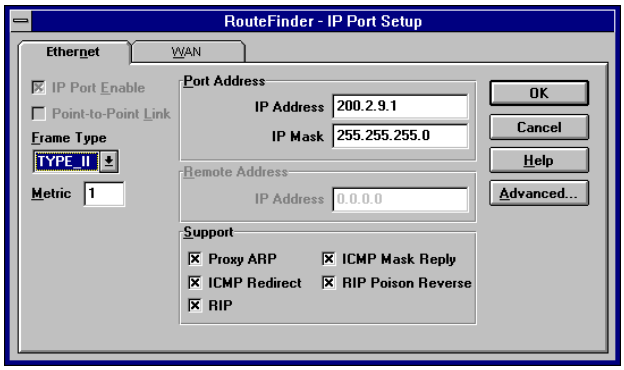
3. In the IP Port Setup dialog box, click on the **Advanced** button.



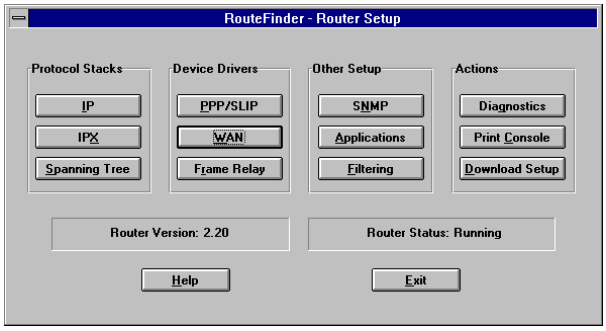
4. In the IP General Setup dialog box, click on the **IP Routing Enable** check box to disable the IP Routing.



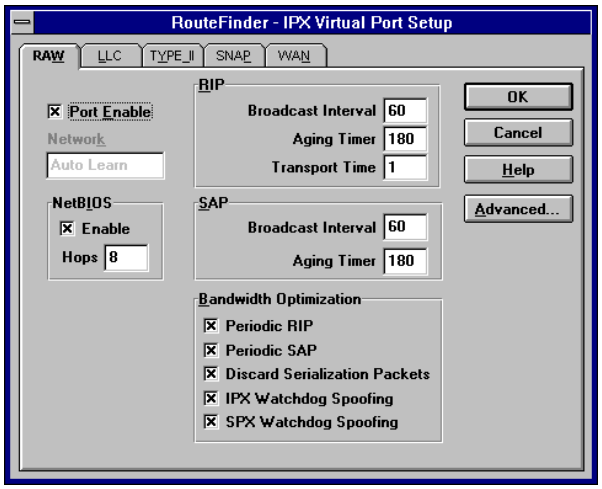
Click on **OK** to return to the IP Port Setup dialog box.



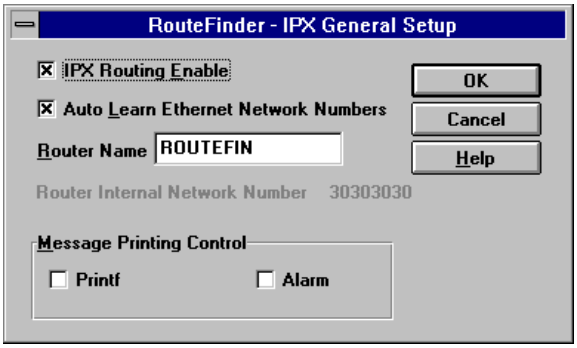
5. Click on **OK** to return to the Router Setup dialog box.



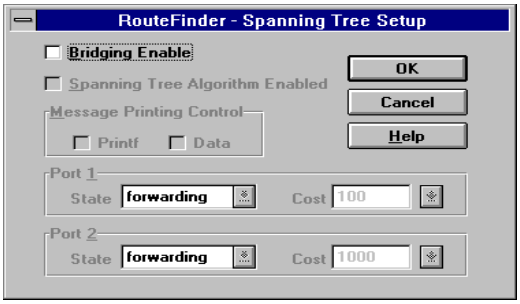
6. In the Router Setup dialog box, click on the **IPX** button.



7. In the IPX Virtual Port Setup dialog box, click on the **Advanced** button to display the IPX General Setup dialog box.

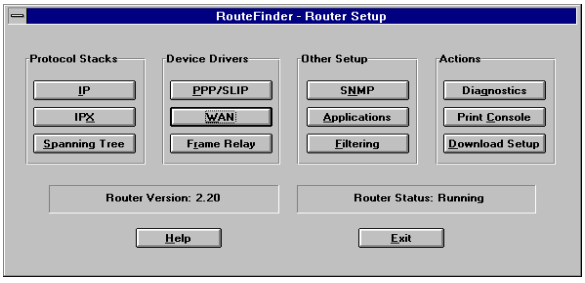


8. In the IPX General Setup dialog box, click on the **IPX Routing Enable** check box to disable the IPX routing. Then, click on the **OK** button to return to the IPX Virtual Port Setup dialog box.
9. Click on the **OK** button in the IPX Virtual Port Setup dialog box to return to the Router Setup dialog box.
10. In the Router Setup dialog box, click on the **Spanning Tree** button. The Spanning Tree dialog box is displayed.

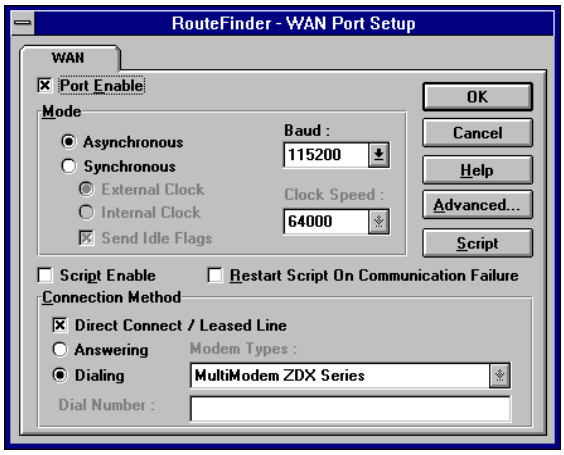


11. Ensure that **Bridging** and **Spanning Tree Algorithm Enable** check boxes are enabled and that Ports 1 and 2 display **forwarding**.

    Click on the **OK** button when you are satisfied with your selection. The Router Setup dialog box is displayed.



12. In the RouteFinder[100] Setup dialog box click on the **WAN** button.
13. The WAN Port Setup dialog box is displayed with the Port Enabled, Mode set for Asynchronous, and the Connection Method set to Direct Connect/Leased Line and Dialing.



With a dial-up line and an async modem, the Mode needs to be Asynchronous (the default) and the Connection Method needs to be either Answering or Dialing. For the St. Louis site it needs to be Dialing.

With a leased line, the Mode needs to be Synchronous and the Connection Method needs to be Direct Connect/Leased Line.

For a dial-up connection, perform steps 14,15,and 16 and then skip to step 18.

For a leased line connection, skip to step 17.

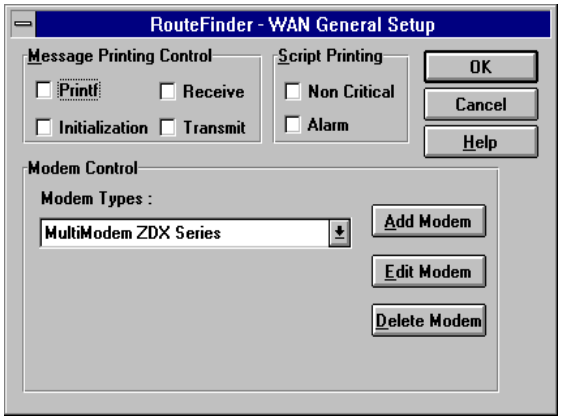
14. Change the Connection Method to Dialing by clicking on the **Dialing** check box.

    For the St. Louis LAN, the WAN Port Setup dialog box should have the following fields checked:

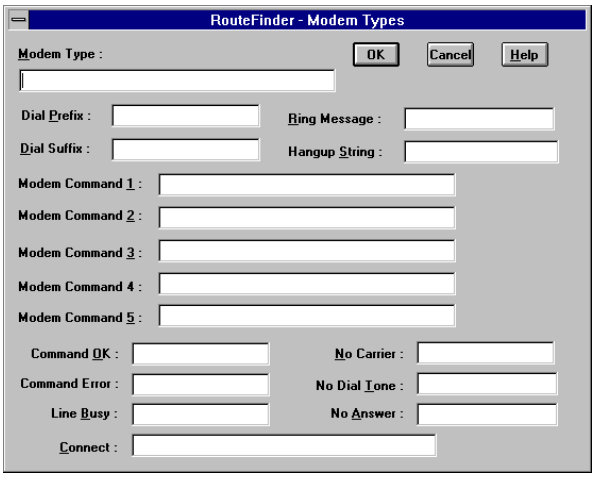
    [X] Port Enable [X] Asynchronous

    [X] 115200 [X] Dialing

15. Click on the **Advanced** button to display the WAN General Setup dialog box.



16. Click on the **Modem Types** drop down text box and click on your modem type. If your WAN device is not listed in this text box, click on the **Add Modem** button to display the Modem Types dialog box.



At a minimum, you need to enter the type of WAN device connected to the WAN port (e.g., I-WAy Hopper for the Multi-Tech's ISDN Terminal Adapter) in the **Modem Type** field. You also need to fill in the **Dial Prefix** field, e.g., ATDT, and the **Modem Command 1** field with an initialization string for your device, e.g., AT&F for the default configuration. Refer to the WAN device User Documentation for this information.

17. Click on **Synchronous** in the Mode check box. Then refer to the WAN Device User Documentation to determine whether the device can supply clocking or if it needs the clock produced by the RouteFinder[100]. Click on the appropriate **Clock** check box and if Internal Clock is necessary, click on **Clock Speed** pull down list box and highlight the clock speed.

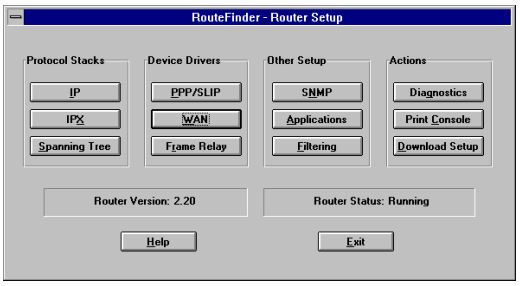
    For the St. Louis LAN, the WAN Port Setup dialog box should have the following fields checked:

    [X] Port Enable [X] Synchronous

    [X] Internal Clock or External Clock (Clock Speed _____)

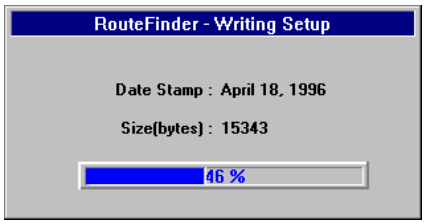
    [X] Direct Connect/Leased Line

18. Click on the **OK** button to return to the Router Setup dialog box.

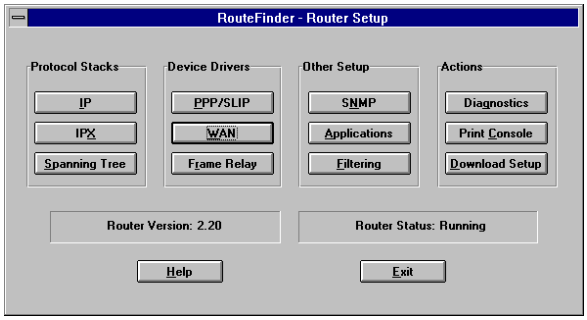


19. Click on the **Download Setup** button to change the configuration of the RouteFinder[100].

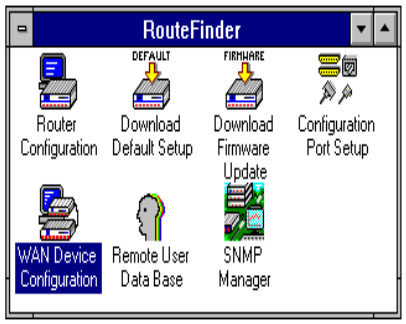
20. Click on the **OK** button to continue.



21. When the downloading is complete and the RouteFinder[100] has rebooted (FAIL LED is Off), the Router Setup dialog box is displayed with the Router Status showing Running.

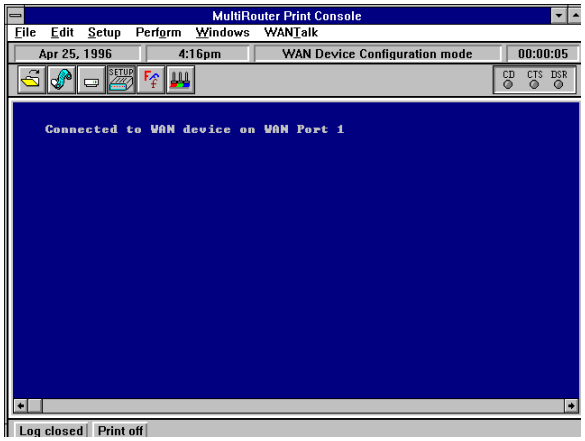


22. Click on the **Exit** button in the Router Setup dialog box, to return to the Program Manager screen.



23. Double click on the **WAN Device Configuration** icon.

24. The Router Print Console menu is displayed, you can enter AT commands to configure the external ISDN TA.



Refer to your WAN device User Documentation for configuration.

25. When your external ISDN TA is configured, click on **File** in the Tool Bar and then click on **Exit** in the dialog box.

6.3 Setting up a Frame Relay Network

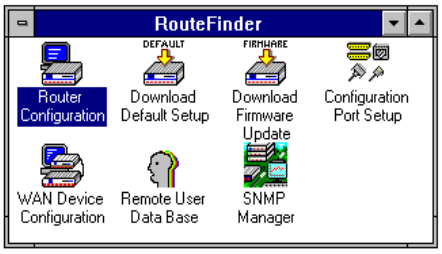
This example provides procedures for configuring a frame relay network with dual DLCIs at the Mounds View Site. The Mounds View site is allowed to communicate with two remote sites; one at River Falls and the second at Minneapolis. With the dual DLCIs at the Mounds View site, this allows a virtual path to the River Falls site and a second virtual path to the Minneapolis site with only one physical connection from the Mounds View site to the frame relay network.

To ensure that the LANs, virtual WANs, and the DLCIs all communicate together, the Mounds View site is going to be configured first. This will ensure that the LAN address are unique, the virtual WANs are in the same network, and that the virtual WAN is mapped to a DLCI.

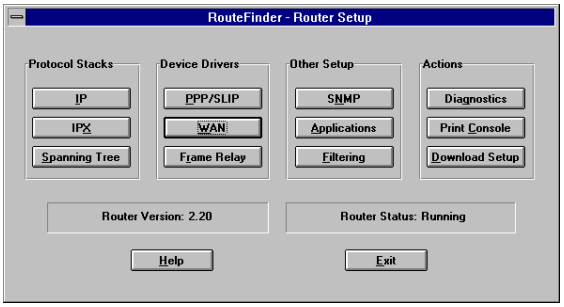
Figure 6-4. Frame Relay Network with Dual PVCs

6.3.1 Configuring the Mounds View Site

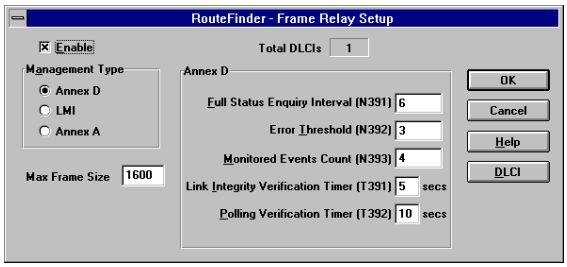
1. From the console pc, load Windows® and at the RouteFinder Program Group, double click on the Router Configuation icon.



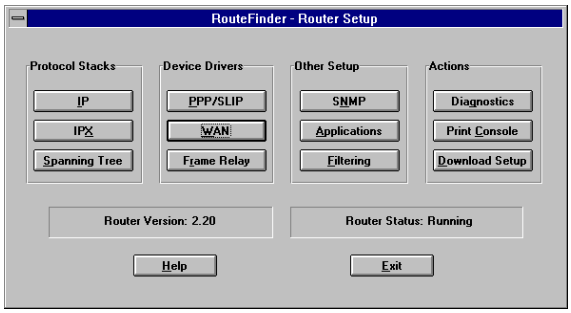
2. When the RouteFinder Setup dialog box is displayed, click on the **Frame Relay** button.



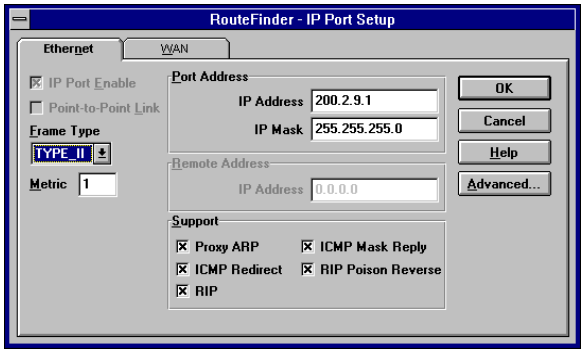
3. The Frame Relay setup dialog box is displayed, click on the **Enable** check box to activate frame relay. Nothing else has to be done in this dialog box at this time. We will come back to this dialog box later.



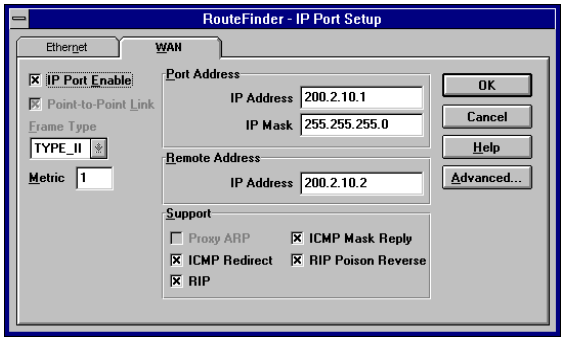
4. Click on the **OK** button in the Frame Relay Setup dialog box to return to the Main menu.



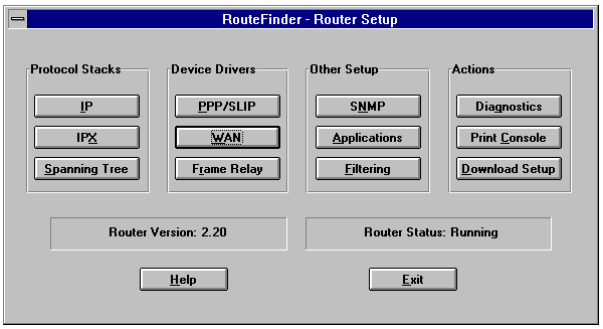
5. From the Main menu, click on the **IP** button to display the IP Port Setup dialog box.
6. The IP Port Setup dialog box is displayed with the Ethernet tab highlighted and the default Ethernet Port IP Address Displayed.



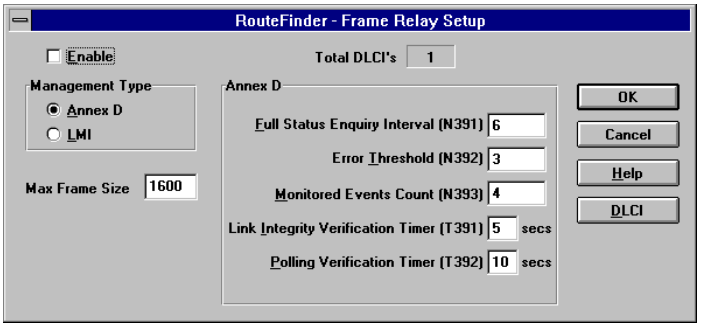
7. Change the default Port Address group IP Address to 200.2.8.1 for the Ethernet port of the Mounds View LAN (LAN 1). To change the default IP Address, click on the Port Address IP Address text box and backspace through the default address. Enter **200.2.8.1**.
8. Click on the **WAN** tab to display the WAN Port and Remote default Address for the logical WAN shown in the lower left corner of the dialog box.



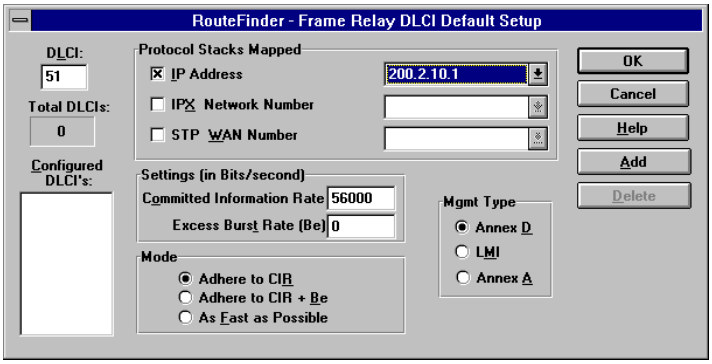
9. Change the default WAN Port Address group IP Address for the Mounds View LAN by clicking on the **IP Address** text box and back spacing thru the default address. Enter WAN IP Address **200.2.9.1** for logical WAN 1.
10. Change the default **Remote Address group IP Address** for logical WAN 1 by clicking on the IP Address text box and back spacing thru the default address. Enter the Remote IP Address of **200.2.9.2**.
11. Click on the **Save Changes** button to save the logical WAN 1 configuration.
12. Click on the **OK** button to return to the Main menu.



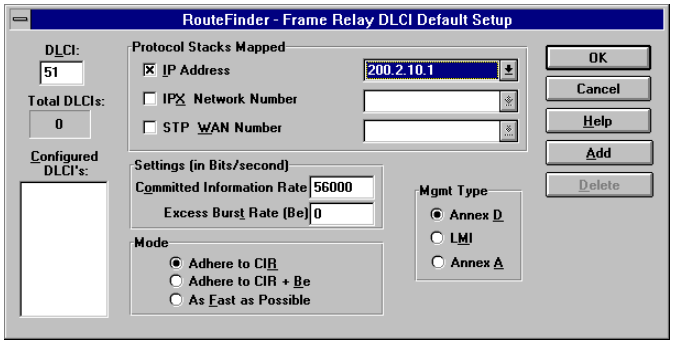
13. Click on the **Frame Relay** button to display the Frame Relay Setup dialog box.



14. Select the Management Type that corresponds to what was provided by your Frame Relay network provider at the time of subscription. In this example lets assume that it is Annex D. So nothing has to be done in this dialog box.
15. Click on the **DLCI** button to display the Frame Relay DLCI dialog box.

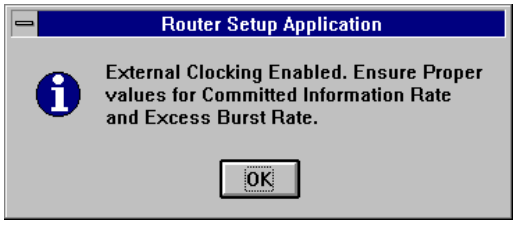


16. To map DLCI 50 to logical WAN 1, click on the DLCI numeric dialog box and enter the number **50**. When the number 50 is entered, all the other groups in the dialog box become active.

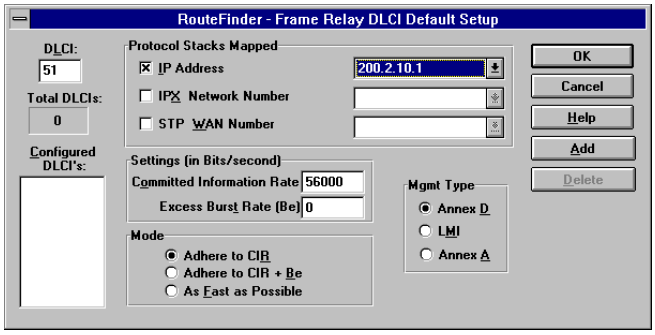


17. Click on the **Protocol Stacks Mapped group IP Address** option button to map the IP protocol to DLCI.
18. Click on the IP Address **down arrow** and a drop down list box displays the IP addresses for the stack. Click on the WAN port IP Address **200.2.9.1**.
19. Move to the Settings (in Bits/second) group and lets leave the Committed Information at 56000, but change the **Excess Burst Rate (Be)** from 0 to 9000. Click on the 0 and back space thru the 0 and then enter **9000**.

    The reason we are setting up these values is that in this example, the DSU connected to the frame relay network is a T1 DSU. A port capacity of 128K bandwidth was defined by your frame relay network provider which could be divided into two 64K virtual circuits. Each DLCI then is allocated 64K in which the CIR could be 64K with a Be of zero. Maybe a better allocation would be a CIR of 56K and a Be of 9K. This may cut down on conjestion on the frame relay network.
20. Now move to the Mode group and click on the **Adhere to CIR + Be** option button.
21. Click on the **Add** button to configure DLCI 50.


Router Setup Application
External Clocking Enabled. Ensure Proper values for Committed Information Rate and Excess Burst Rate.
OK

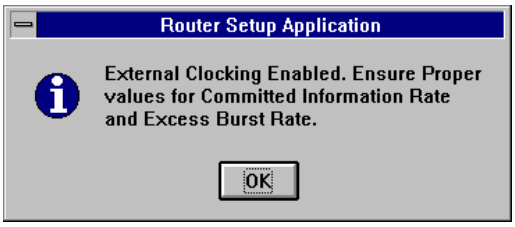
22. The External Clocking Enabled. Ensure Proper values for Excess Burst Rate and Committed Information Rate dialog box is displayed, click on **OK** to configure DLCI 50.
23. Now to configure DLCI 51, click on the DLCI numeric dialog box again and enter number **51**.



24. Click on the **Protocol Stacks Mapped group IP Address** option button to map the IP protocol to DLCI.
25. Click on the **IP Address down arrow** and a drop down list box displays the IP addresses for the stack. Click on the WAN port IP Address **200.2.10.1**.

26. Move to the **Settings (in Bits/second)** group and lets leave the Committed Information at 56000, but change the Excess Burst Rate (Be) from 0 to 9000. Click on the 0 and back space thru the 0 and then enter **9000**.

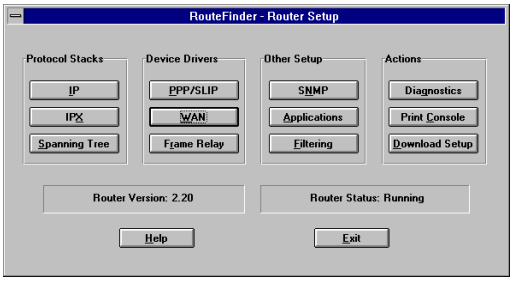
27. Finally click on the **Add** button to configure DLCI 51.


Router Setup Application
External Clocking Enabled. Ensure Proper values for Committed Information Rate and Excess Burst Rate.
OK

28. The External Clocking Enabled. Ensure Proper values for Excess Burst Rate and Committed Information Rate dialog box is displayed, click on **OK** to configure DLCI 51.

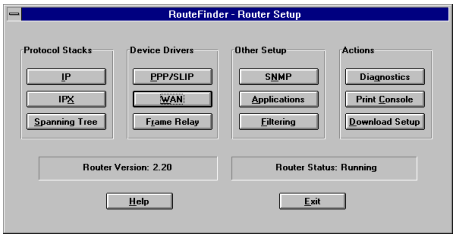
29. Click on the **OK** button in the Frame Relay DLCI dialog box to return to the Frame Relay Setup dialog box.

30. Click on the **OK** button in the Frame Relay Setup dialog box to return to the Main menu.



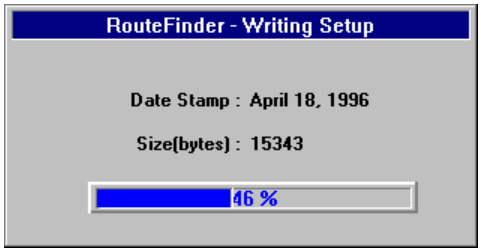
31. Click on the **Download Setup** button to down load the frame relay configuration to the RouteFinder.

32. Click on the **OK** to continue.

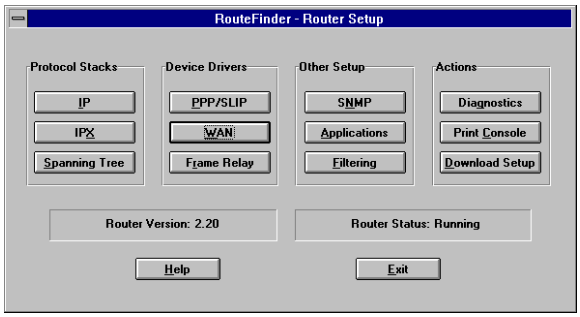


The "Looking for response from RouteFinder" dialog box is displayed momentarily.

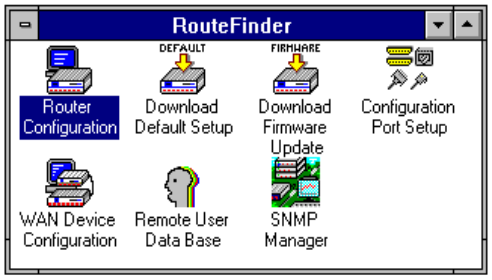
33. The Writing setup dialog box is displayed as the setup configuration is written to the RouteFinder.



34. When the downloading is complete and the RouteFinder has rebooted (FAIL LED is Off), the RouteFinder Setup dialog box is displayed with the RouteFinder Status showing Running.

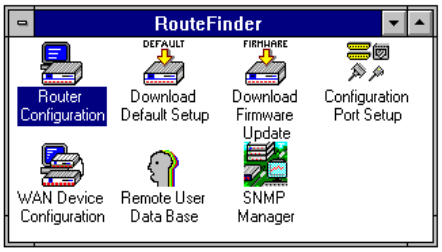


35. Click on the **Exit** button in the RouteFinder Setup dialog box to return to the Program Manager screen.

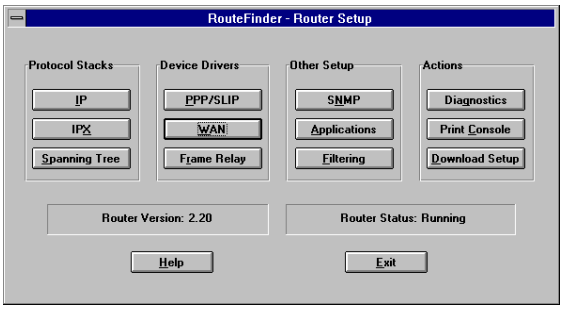


6.3.2 Configuring the River Falls Site

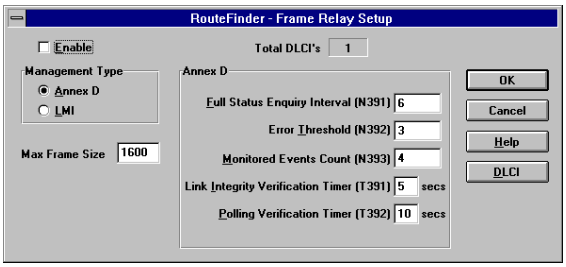
1. From the console pc, load Windows® and at the RouteFinder Program Group, double click on the Router Configuation icon.



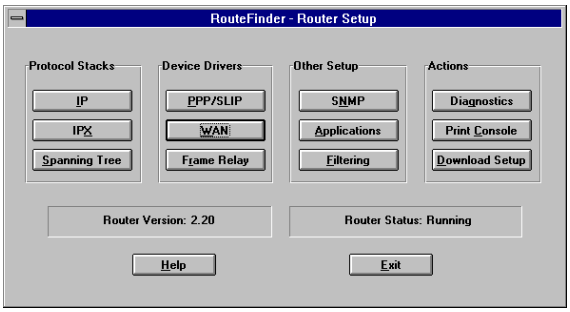
2. When the RouteFinder Setup dialog box is displayed, click on the **Frame Relay** button.



3. The Frame Relay setup dialog box is displayed, click on the **Enable** check box to activate frame relay. Nothing else has to be done in this dialog box at this time. We will come back to this dialog box later.

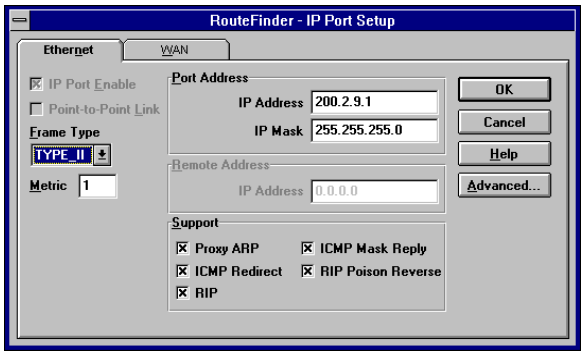


4. Click on the **OK** button in the Frame Relay Setup dialog box to return to the Main menu.

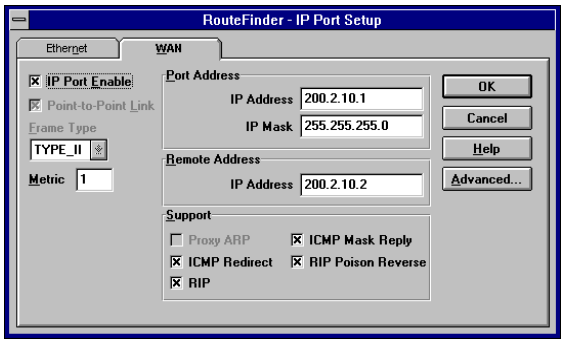


5. From the Main menu, click on the **IP** button to display the IP Port Setup dialog box.

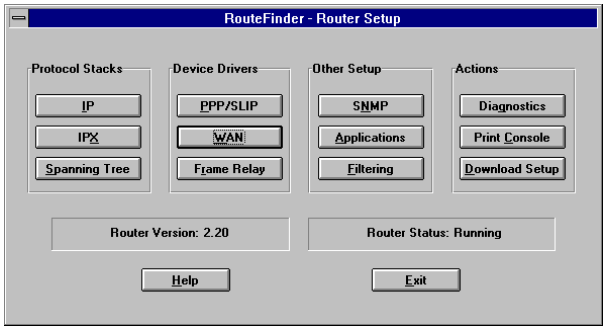
6. The IP Port Setup dialog box is displayed with the Ethernet tab highlighted and the default Ethernet Port IP Address Displayed.



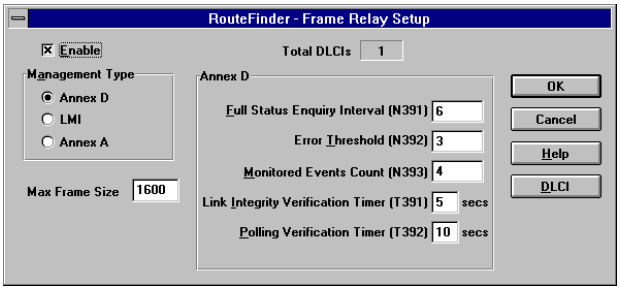
7. Change the default Port Address group IP Address to 200.2.11.1 for the Ethernet port of the River Falls LAN (LAN 2). To change the default IP Address, click on the Port Address IP Address text box and backspace through the default address. Enter **200.2.11.1**.
8. Click on the **WAN** tab to display the WAN Port and Remote default Addresses for the logical WANs shown in the lower left corner of the dialog box.



9. Change the default WAN Port Address group IP Address for the River Falls LAN by clicking on the **IP Address** text box and back spacing thru the default address. Enter WAN IP Address **200.2.9.2** for logical WAN 1.
10. Change the default **Remote Address group IP Address** for logical WAN 1 by clicking on the IP Address text box and back spacing thru the default address. Enter the Remote IP Address of **200.2.9.1**.
11. Click on the **Save Changes** button to save the logical WAN 1 configuration.
12. Click on the **OK** button to return to the Main menu.

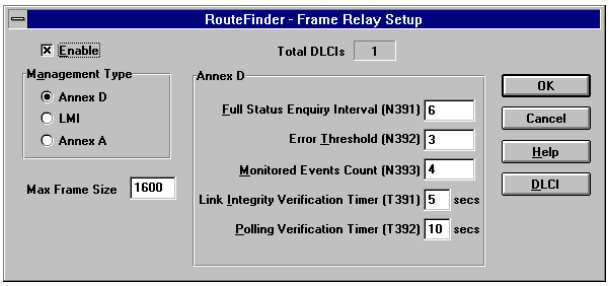


13. Click on the **Frame Relay** button to display the Frame Relay Setup dialog box.

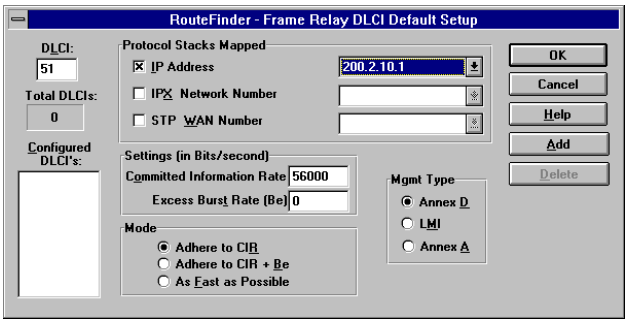


14. Select the Management Type that corresponds to what was provided by your Frame Relay network provider at the time of subscription. In this example lets assume that it is Annex D. So nothing has to be done in this dialog box.

15. Click on the **DLCI** button to display the Frame Relay DLCI dialog box.



16. To map DLCI 50 to logical WAN 1, click on the DLCI numeric dialog box and enter the number **52**. When the number 52 is entered, all the other groups in the dialog box become active.



17. Click on the **Protocol Stacks Mapped group IP Address** option button to map the IP protocol to DLCI.

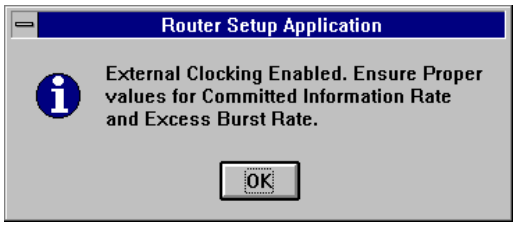
18. Click on the IP Address **down arrow** and a drop down list box displays the IP addresses for the stack. Click on the WAN port IP Address **200.2.9.2**.

19. Move to the Settings (in Bits/second) group and lets leave the Committed Information at 56000, but change the **Excess Burst Rate (Be)** from 0 to 9000. Click on the 0 and back space thru the 0 and then enter **9000**.

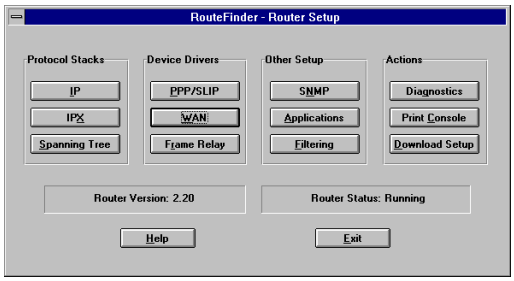
    The reason we are setting up these values is that in this example, the DLCI is allocated 64K in which the CIR could be 64K with a Be of zero. Maybe a better allocation would be a CIR of 56K and a Be of 9K. This may cut down on conjestion on the frame relay network.

20. Now move to the Mode group and click on the **Adhere to CIR + Be** option button.

21. Click on the **Add** button to configure DLCI 52.

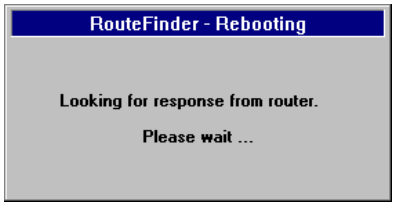

Router Setup Application
External Clocking Enabled. Ensure Proper values for Committed Information Rate and Excess Burst Rate.
OK

22. The External Clocking Enabled. Ensure Proper values for Excess Burst Rate and Committed Information Rate dialog box is displayed, click on **OK** to configure DLCI 52.
23. Click on the **OK** button in the Frame Relay DLCI dialog box to return to the Frame Relay Setup dialog box.
24. Click on the **OK** button in the Frame Relay Setup dialog box to return to the Main menu.



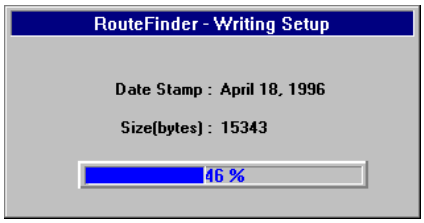
25. Click on the **Download Setup** button to down load the frame relay configuration to the RouteFinder.

26. Click on the **OK** to continue.

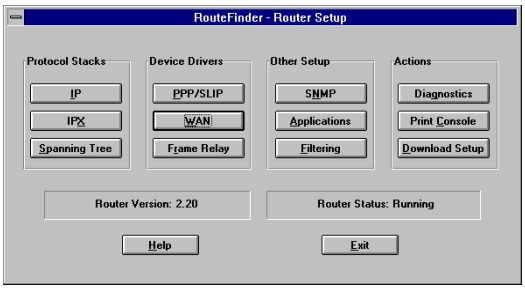


The "Looking for response from RouteFinder" dialog box is displayed momentarily.

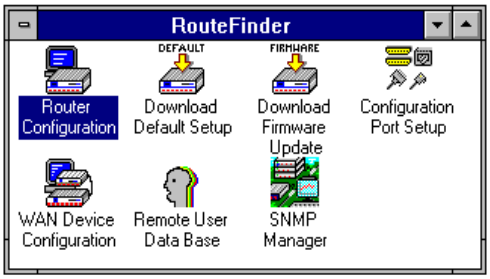
27. The Writing setup dialog box is displayed as the setup configuration is written to the RouteFinder.



28. When the downloading is complete and the RouteFinder has rebooted (FAIL LED is Off), the RouteFinder Setup dialog box is displayed with the RouteFinder Status showing Running.

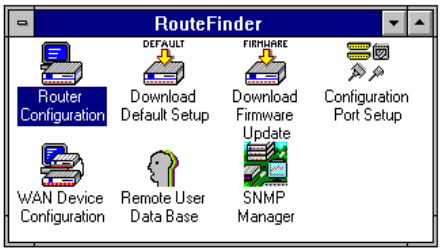


29. Click on the **Exit** button in the RouteFinder Setup dialog box to return to the Program Manager screen.

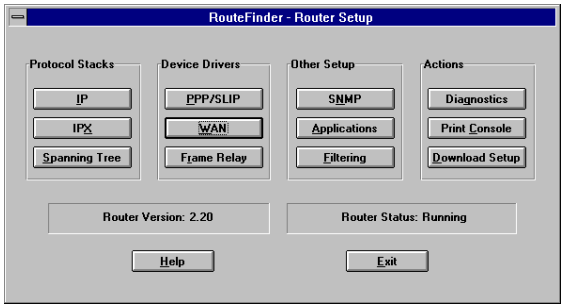


6.3.3 Configuring the Minneapolis Site

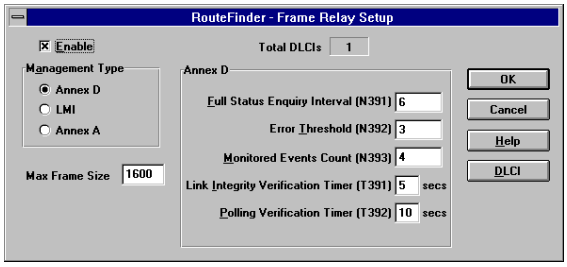
1. From the console pc, load Windows® and at the RouteFinder Program Group, double click on the Router Configuation icon.



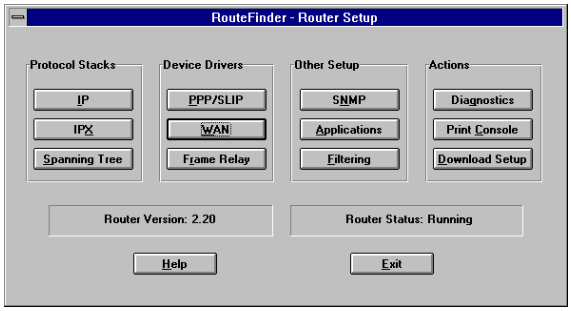
2. When the RouteFinder Setup dialog box is displayed, click on the **Frame Relay** button.



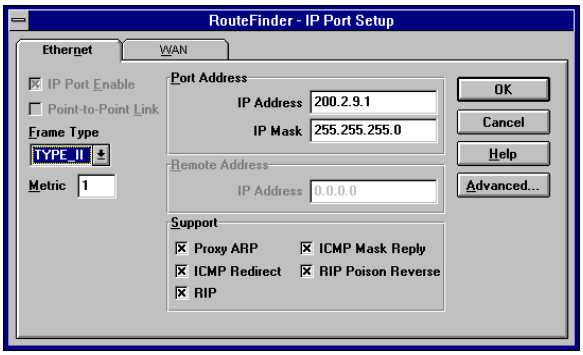
3. The Frame Relay setup dialog box is displayed, click on the **Enable** check box to activate frame relay. Nothing else has to be done in this dialog box at this time. We will come back to this dialog box later.



4. Click on the **OK** button in the Frame Relay Setup dialog box to return to the Main menu.

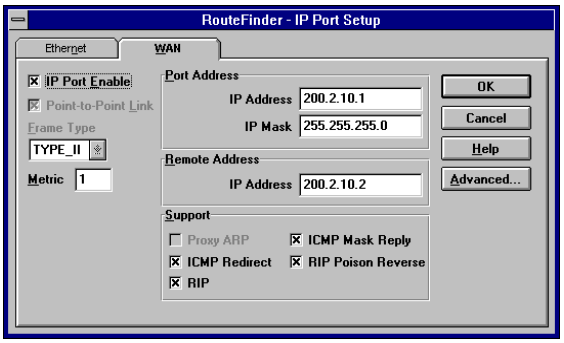


5. From the Main menu, click on the **IP** button to display the IP Port Setup dialog box.
6. The IP Port Setup dialog box is displayed with the Ethernet tab highlighted and the default Ethernet Port IP Address Displayed.



7. Change the default Port Address group IP Address to 200.2.12.1 for the Ethernet port of the Minneapolis LAN (LAN 3). To change the default IP Address, click on the Port Address IP Address text box and backspace through the default address. Enter **200.2.12.1**.

8. Click on the **WAN** tab to display the WAN Port and Remote default Addresses for the logical WANs shown in the lower left corner of the dialog box.

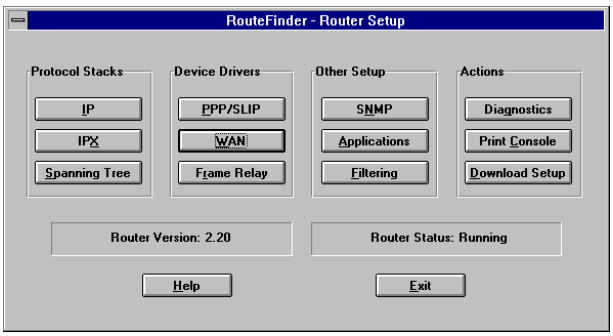


9. Change the default WAN Port Address group IP Address for the Minneapolis LAN by clicking on the **IP Address** text box and back spacing thru the default address. Enter WAN IP Address **200.2.10.2** for logical WAN 1.

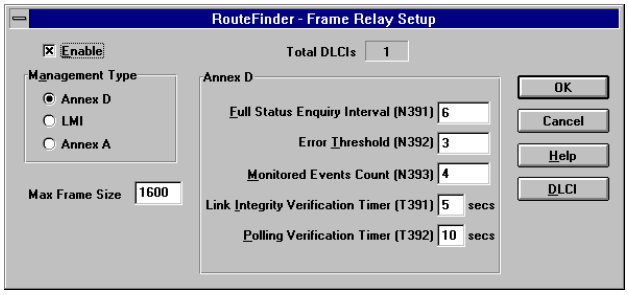
10. Change the default **Remote Address group IP Address** for logical WAN 1 by clicking on the IP Address text box and back spacing thru the default address. Enter the Remote IP Address of **200.2.10.1**.

11. Click on the **Save Changes** button to save the logical WAN 1 configuration.

12. Click on the **OK** button to return to the Main menu.

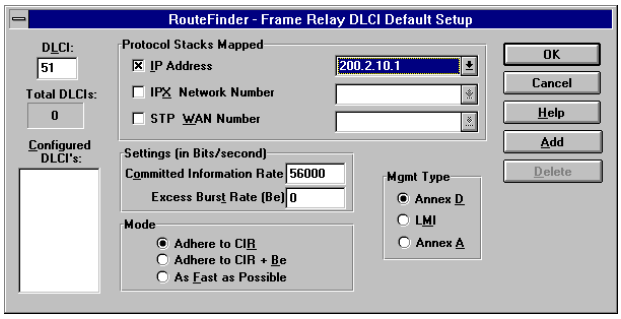


13. Click on the **Frame Relay** button to display the Frame Relay Setup dialog box.

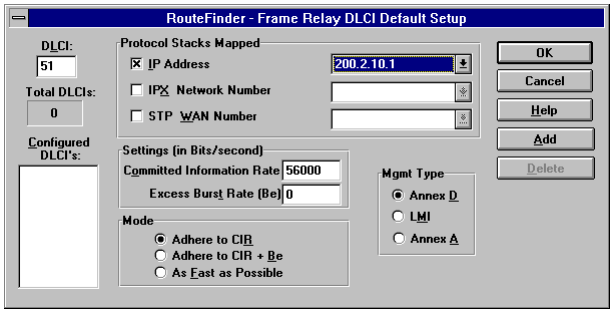


14. Select the Management Type that corresponds to what was provided by your Frame Relay network provider at the time of subscription. In this example lets assume that it is Annex D. So nothing has to be done in this dialog box.

15. Click on the **DLCI** button to display the Frame Relay DLCI dialog box.



16. To map DLCI 53 to logical WAN 1, click on the DLCI numeric dialog box and enter the number **53**. When the number 52 is entered, all the other groups in the dialog box become active.



17. Click on the **Protocol Stacks Mapped group IP Address** option button to map the IP protocol to DLCI.

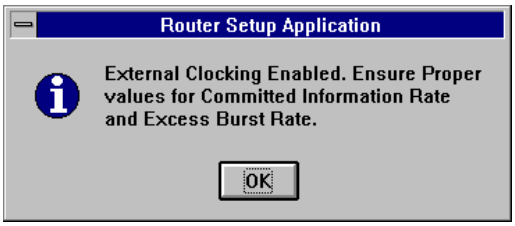
18. Click on the IP Address **down arrow** and a drop down list box displays the IP addresses for the stack. Click on the WAN port IP Address **200.2.10.2**.

19. Move to the Settings (in Bits/second) group and lets leave the Committed Information at 56000, but change the **Excess Burst Rate (Be)** from 0 to 9000. Click on the 0 and back space thru the 0 and then enter **9000**.

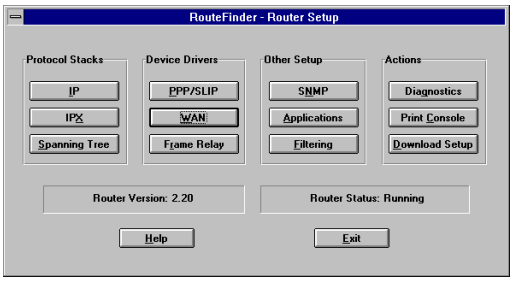
    The reason we are setting up these values is that in this example, the DLCI is allocated 64K in which the CIR could be 64K with a Be of zero. Maybe a better allocation would be a CIR of 56K and a Be of 9K. This may cut down on conjestion on the frame relay network.

20. Now move to the Mode group and click on the **Adhere to CIR + Be** option button.

21. Click on the **Add** button to configure DLCI 53.

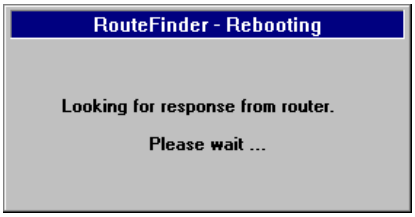

Router Setup Application
External Clocking Enabled. Ensure Proper values for Committed Information Rate and Excess Burst Rate.
OK

22. The External Clocking Enabled. Ensure Proper values for Excess Burst Rate and Committed Information Rate dialog box is displayed, click on **OK** to configure DLCI 53.
23. Click on the **OK** button in the Frame Relay DLCI dialog box to return to the Frame Relay Setup dialog box.
24. Click on the **OK** button in the Frame Relay Setup dialog box to return to the Main menu.



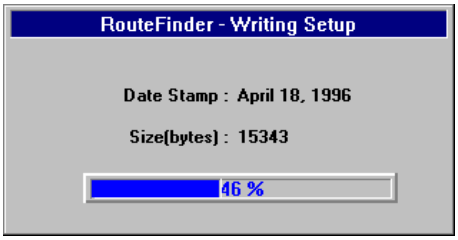
25. Click on the **Download Setup** button to down load the frame relay configuration to the RouteFinder.

26. Click on the **OK** to continue.

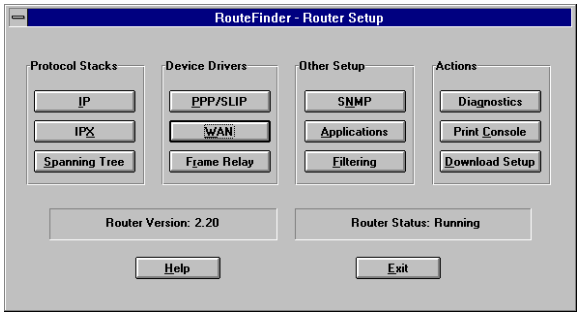


The "Looking for response from RouteFinder" dialog box is displayed momentarily.

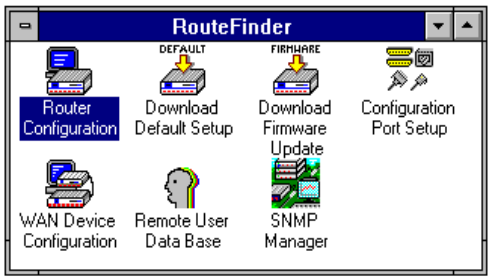
27. The Writing setup dialog box is displayed as the setup configuration is written to the RouteFinder.



28. When the downloading is complete and the RouteFinder has rebooted (FAIL LED is Off), the RouteFinder Setup dialog box is displayed with the RouteFinder Status showing Running.



29. Click on the **Exit** button in the RouteFinder Setup dialog box to return to the Program Manager screen.



RouteFinder 100™

Single WAN Multi-Protocol Router

Chapter 7 - Remote Configuration

MultiTech® Systems

7.1 Introduction

This chapter provides procedures for changing the configuration of a remote unit. Remote configuration allows a PC at one site (local site) to communicate with a remote RouteFinder[100] and change the configuration of that remote RouteFinder[100]. Remote configuration can be accomplished either directly through the LAN or remotely using modems. To remotely configure a RouteFinder[100], a local PC needs to be connected to a dial-up line and the MultiRouter software configured to call the remote RouteFinder[100]. The remote RouteFinder[100] needs to have a modem connected to a dial-up line and the Command Port. Once the connection to the remote RouteFinder[100] is made, you can change the configuration as you see fit. Once the configuration is changed, you can down load the new configuration to the remote RouteFinder[100]. Refer to the Modem- Based Remote Configuration Procedure (Paragraph 7.2) to remotely configure a RouteFinder[100].

To configure the remote RouteFinder[100] through the LAN, change the communication type to the IP based Trivial File Transfer Protocol (known as TFTP) and change the configuration as you see fit. Refer to the LAN-Based Remote Configuration Procedure (Paragraph 7.3) to configure a remote RouteFinder[100].

7.2 Modem-Based Remote Configuration Procedure

1 At the remote site, remove the serial cable from the PC to the RouteFinder[100].

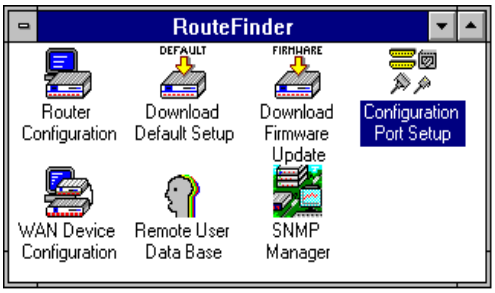
2 At the remote site, connect a special cable (Remote Configuration Cable) to the RJ45 to DB25 cable from the RouteFinder[100] and the RS232 connector on the modem. The special cable is a serial cable with male connectors on both ends. Refer to Appendix A for for cable details.

Connect the modem to your local telephone line.

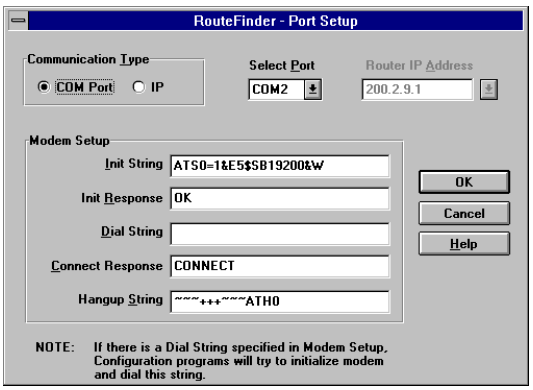
Provide your telephone number to the person verifying your configuration.

3 At the main site, connect your local PC to a modem that is connected to a dial-up line.

4 Install the RouteFinder software on the local PC and at the Windows Program Manager screen, double click on the **Configuration Port Setup** Icon.



5 The Port Setup dialog box is displayed.



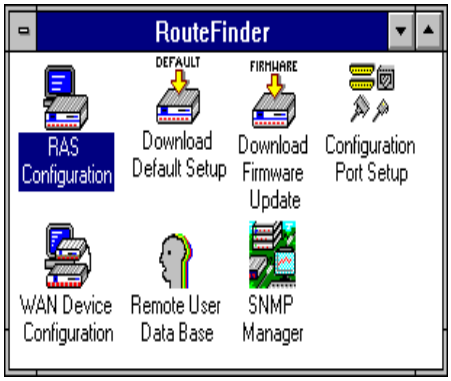
Verify that the **Communication Type** field is set **COM Port** and the **Select Port** field is set for the Com port of your local PC.

In the **Dial String** field, enter the AT command for dialing (ATDT) plus the phone number of the remote RouteFinder[100].

If your Modem Initialization String, Initialization Response, or Connect Response values are different than the defaults in the dialog box, refer to your modem user documentation and change the default values to match your modem.

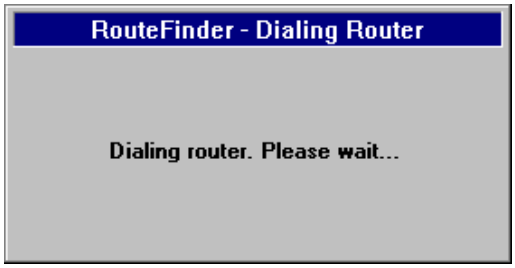
Click on **OK** when you are satisfied with your selections.

6 The windows Program Manager menu is displayed.

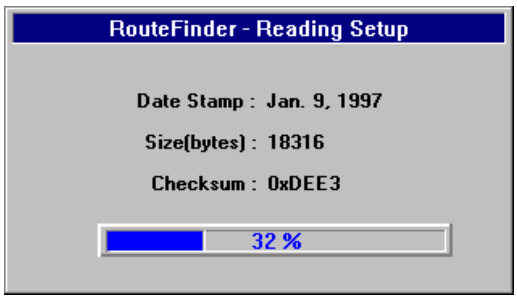


Double click on the **Router Configuration** icon.

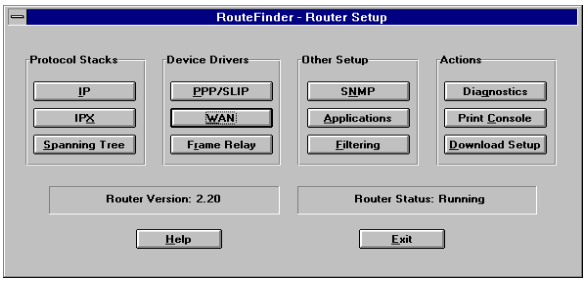
7 The Dialing Router dialog box is displayed while software is dialing the remote RouteFinder[100].



8 The Reading Setup dialog box is displayed.



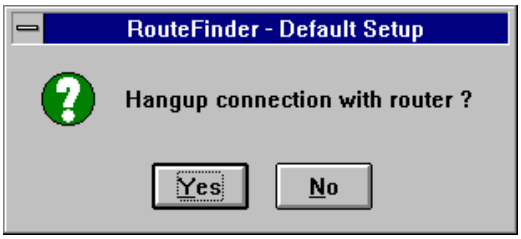
9 The Router Setup dialog box is then displayed. This is the dialog box of the remote RouteFinder[100]. You can select any of the Protocol Stacks, Device drivers, or other buttons and change the configuration of the remote RouteFinder[100]. Refer to the Menus Chapter (Chapter 5) for the definition of each dialog box and field within a dialog box.



10 After you have changed the configuration of the remote RouteFinder[100], click on the **Download Setup** button to update the configuration. The remote RouteFinder[100] will be brought down, the new configuration written to the unit, and the unit will reboot.

11 Click on the **Exit** button when the downloading is complete.

12 The Hangup connection with Router? dialog box is displayed.



Click on the **Yes** button to disconnect the phone connection to the remote site.

13 If the same telephone number is not going to be used again in the immediate future, you may want to remove it from the Port Setup dialog box.

14 At the remote site, reconnect the RouteFinder[100] to the serial port of the PC, and from the Program Manager screen click on the **Router Configuartion** icon to verify that the RouteFinder[100] is running.

7.3 LAN-Based Remote Configuration

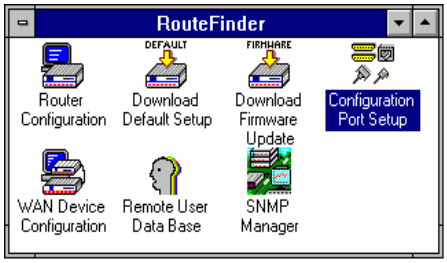
Windows Sockets Compliant TCP/IP Stack

SNMP requires a Windows Sockets compliant TCP/IP stack. Microsoft provides a TCP/IP stack free for Windows for Workgroups 3.11. TCP/IP protocol software must be installed and functional before SNMP can be used.

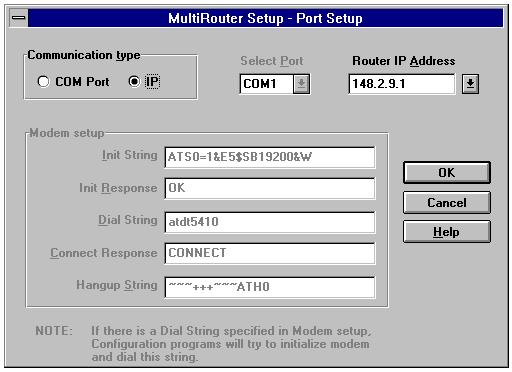
1 You must assign an internet (IP) address for the PC and for each node that will be managed by SNMP. Refer to the protocol software documentation for instructions on how to set the IP addresses.

Once you have completed this step, you should be able to use the protocol Ping command for the PC host name. You should also test the network interface configurtion by Pinging another TCP/IP device that is connected to the network.

2 Install the RouteFinder software on the local PC and at the Windows Program Manager screen, double click on the **Configuration Port Setup** Icon.



3 The Port Setup dialog box is displayed.

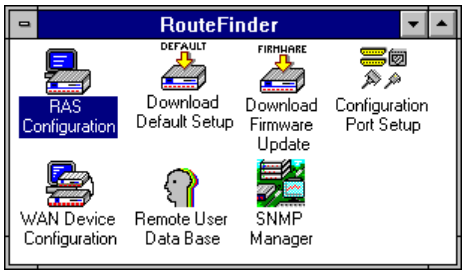


Verify that the **Communication Type** field is set **IP.**

In the **Router IP Address** field, enter the IP Address of the remote RouteFinder[100].

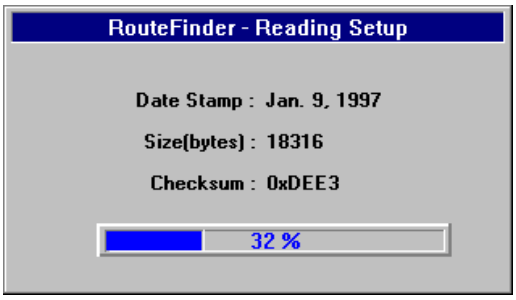
4 Click on **OK** when you are satisfied with your selections.

The windows Program Manager menu is displayed.

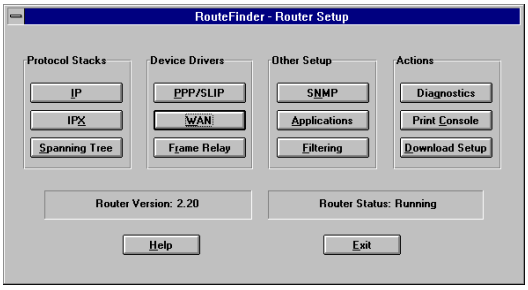


5 Double click on the **Router Configuration** icon.

The Reading Setup dialog box is displayed.



6 The Router Setup dialog box is then displayed. This is the dialog box of the remote RouteFinder[100]. You can select any of the Protocol Stacks, Device drivers, or other buttons and change the configuration of the remote RouteFinder[100]. Refer to the Menus Chapter (Chapter 5) for the definition of each dialog box and field within a dialog box.



7 After you have changed the configuration of the remote RouteFinder[100], click on the **Download Setup** button to update the configuration. The remote RouteFinder[100] will be brought down, the new configuration written to the unit, and the unit will reboot.

8 Click on the **Exit** button when the downloading is complete.

9 Click on the Router Configuration icon in the Program Manager screen to verify that the RouteFinder[100] is running.

RouteFinder 100™

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Chapter 8 - Router Management

MultiTech® Systems

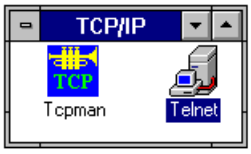
8.1 Introduction

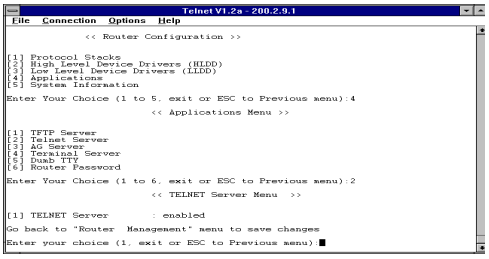
This chapter describes a Simple Network Management Protocol (SNMP) session and its paramenters and typical Telnet applications, such as dial out, router configuation, WAN device configuration, and remote user database. The SNMP description is provided in section 8.2. The Telnet applications are discussed in section 8.3.

8.2 Windows Sockets Compliant TCP/IP Stack

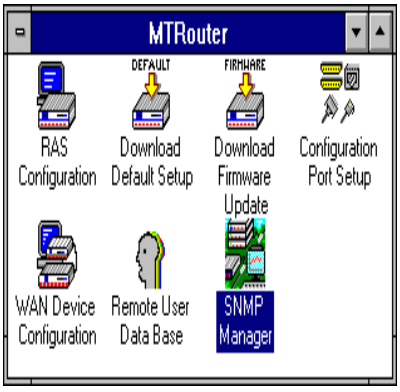
SNMP requires a Windows Sockets compliant TCP/IP stack. Microsoft provides a TCP/IP stack free for Windows for Workgroups 3.11. TCP/IP protocol software must be installed and functional before SNMP can be used.

1 You must assign an internet (IP) address for the PC and for each node that will be managed by SNMP. Refer to the protocol software documentation for instructions on how to set the IP addresses.



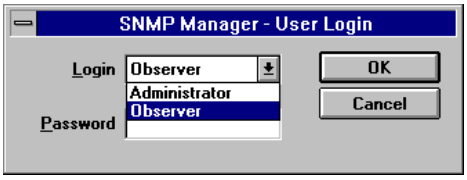


Once you have completed this step, you should be able to use the protocol Ping command for the PC host name. You should also test the network interface configurtion by Pinging another TCP/IP device that is connected to the network.

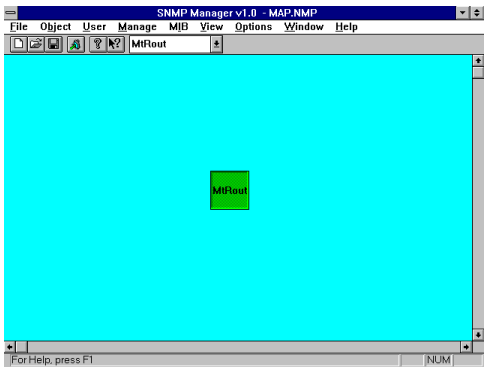


8.2.1 View SNMP Parameters

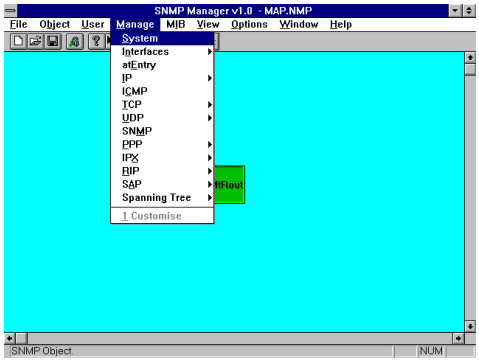
Different SNMP objects from same Agent can be viewed simultaneously. Same SNMP object can be viewed for different Agents simultaneously. If an already viewed SNMP object is chosen, focus is set to the old view.



1. Change Login level to have different privileges; Observer or Administrator.
2. Select the Agent from Toolbar combobox or using Agent menu or Toolbar Button.



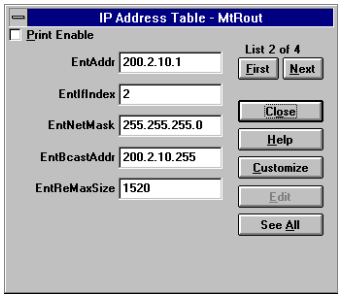
3. Select one of the SNMP objects from the Manage menu. This will initiate the SNMP session and a Customizable Dialog will be displayed after receiving the response.



4. To navigate the instances of SNMP object use the First and the Next buttons. Clicking the First button refreshes the complete SNMP object.

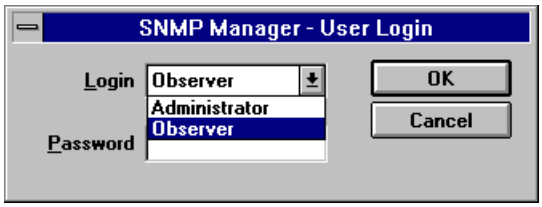
   OR

   To see all instances simultaneously click the See-All button. This display has a limit of 18 parameters and 4 instances OR 20 parameters and 6 instances depending on the screen resolution. If the SNMP object exceeds this limit then scrollbars are shown which enables complete view of the SNMP object.

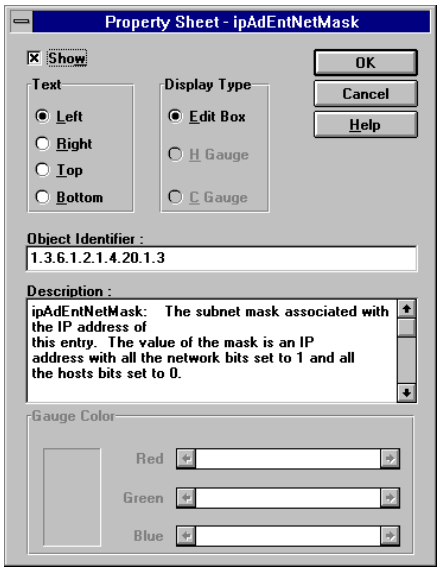


8.2.2 Set SNMP Parameters

This privilege is available only to Administrator level access.

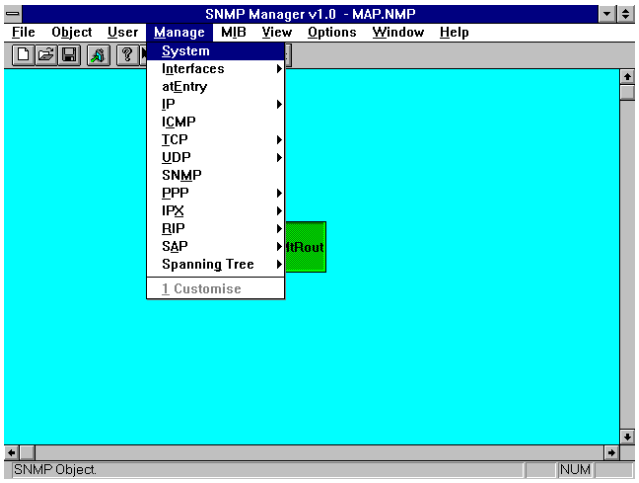


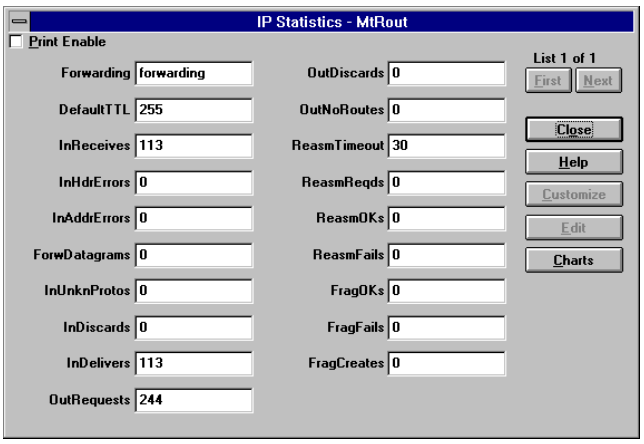
Parameters which can be set are editable after entering into editing mode OR from the MIB information(Property Sheet).



Setting more than one parameter :

From the display dialog click the Edit button to enter into editing mode. Edit button is enabled only if there are parameters which can be set. Parameters which can not be set are displayed with greyed label. Edit the parameter values and click the Set button to set the parameters. This will end the editing mode.





Setting individual parameter :

From the display dialog click the Right Mouse Button over the parameter to be set. This displays MIB information(Property Sheet) which has Set button enabled for settable parameters. After editing the value(OR selecting the value for enumerated parameters), click the Set button.

8.2.3 Customize Display Dialog

This privilege is available only to Administrator level access.

To customize the display Dialog enter into customizing mode by clicking the Customize button.

Customization offers :

- Place the display controls(Edit Box, Horizontal gauge, Circle gauge) using drag 'n' drop with Left Mouse Button. Black Arrow cursor indicates the pivotal point.
- Change display controls from one form to other using Property Sheet by clicking the Right Mouse Button over the display control.
- Hide display control EITHER by dropping on the Hide Button at the right bottom corner of the Dialog OR using Property Sheet by clicking the Right Mouse Button over the display control. Hide Button will activate only if the Black Arrow cursor shown while dragging is over the Hide Button when the display control is dropped.
- Change the fill color of the gauge display using Property Sheet by clicking the Right Mouse Button over the gauge.
- Change the orientation of text associated with Edit Box using Property Sheet by clicking the Right Mouse Button over the Edit Box.

8.2.4 Refresh SNMP Object

For See-One Display :

Click the Next button and then the First button. Possible only for Objects having more than one instances.

OR

Start See-All display and from there come back to See-One display.

For See-All Display :

Scroll the display using any scrollbar. Possible only for Objects having scrollbars.

OR

Start See-One display and from there come back to See-All display.

8.2.5 Customizable Display Dialog

This dialog displays the required SNMP parameters. Parameters are shown as read-only display controls.

Time-dependent parameter values are updated at regular interval, which depends on the time taken to receive response from the Agent. The display is refreshed completely for all parameters after 8(0R 10) such intervals.

It displays the number of lists(i.e. instances) at the right-top corner. Navigate the instances by using the First and Next buttons, OR see all instances simultaneously by clicking the See-All button. Clicking the First button refreshes the complete SNMP object.

To see the MIB information of a parameter click the Right Mouse Button over it.

See All Dialog

This Dialog displays all instances of a SNMP object simultaneously.

To go back to Customizable Dialog click the See-One button.

To close the SNMP object view click the Close button.

8.2.6 Property Sheet

This contains information about the display controls regarding :

1 Object Identifier of the parameter.

2 Description of the parameter.

3 Show status of parameter.

4 Orientation of text for Edit Box.

5 Form of display control(Edit Box, Horizontal Gauge or Circle Gauge).

6 Fill color for gauge display control.

Use this to customize the display.

8.2.7 Property Sheet (MIB Information)

This contains information about the display controls regarding:

1. MIB name of the parameter.
2. Value of the parameter. If the parameter is of enumerated type then the listbox of the combobox contain all the possible values of parameter.
3. Object Identifier of the parameter in ASN.1 notation.
4. Description of the parameter.

It allows to set parameter values. Set button is disabled if the parameter is read-only OR the access is Observer level.

8.2.8 Agent Name Dialog

Two databases are supported for aliases of Agents :

- Local database (SETUP.INI file) ,and
- WINSNMP database (ENTITY.INI file).

This displays the IP address(OR Name) of the Agent which is connected to the SNMP Manager along with a list of Agents from local database.

Local database can be modified by using Add ,Delete or Edit Button. This privilege is available only to Administrator level access.

Local Database gets priority over WINSNMP database for resolving the name to get the IP address. If Agent name exists in local database without corresponding IP address then only it will be resolved from WINSNMP database.

Agent Map Dialog

This enables modifying the local database. Enter Agent IP address and / or aliases to be added to local database. Both can not be empty. If Agent name is specified but IP address is not specified. It will resolve this name from WINSNMP database.

8.2.9 Commands

File menu commands

The File menu offers the following commands:

Exit Exits SNMP Manager.

Agent menu commands

The Agent menu offers the following commands:

Name Display the Agent Name and the local database.

User menu commands

The User menu offers the following commands:

Login Login at a different security level.

Password Change user password.

Login command (User menu)

Use this command to change security level for SNMP Manager session.

Two level Login security is provided :

1. Administrator level enjoys all privileges namely customization, parameter setting, changing user password and modifying local database of aliases. Administrator can change the password for Observer.
2. Observer level can only view parameters. It can neither customize the Dialogs nor set any parameter nor change password nor modify the local database.

   Both levels are supplied with no password at the installation time.

Password command (User menu)

Use this command to change user password for next SNMP Manager sessions.

Only Administrator level access can use this command. Password for any level can be changed.

Manage menu commands

The Manage menu displays SNMP objects which can be managed. Select SNMP object which is to be managed.

View menu commands

The View menu offers the following commands:

Toolbar Shows or hides the toolbar.

Status Bar Shows or hides the status bar.

Options menu commands

The Options menu offers the following commands:

Save Settings on Exit

Saves the arrangement of various views and the corresponding Agent names when you quit SNMP Manager. A check mark beside the command means it is in effect.

Window menu commands

The Window menu offers the following commands :

Cascade	Arrange the various dialogs so that they overlap.

8.2.10 How to send SNMP request successfully

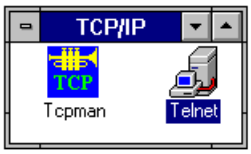
- Check the Agent Name using Agent menu. It can be an IP address or name specified in local database(SETUP.INI) or in WINSNMP database(ENTITY.INI).
- Check the connection.
- Free up some resources by closing any open Dialog.
- Make sure that the Agent Node is powered ON.

8.2.11 How to open SNMP session successfully

- Free up some resources by closing any open Dialog.
- Make sure that MIB.DAT file contains MIB data for requested MIB parameters.
- Make sure that MANAG.INI file contains section with correct names for requested MIB parameters.

8.3 Telnet Management

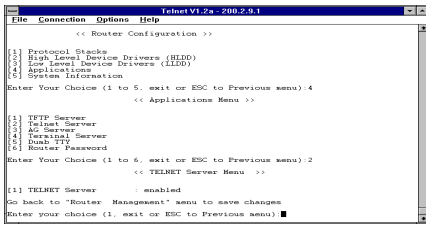
A typical Telnet client application is described in this section. The RouteFinder100 has a built-in Telnet Server for access to the RouteFinder100 through Telnet clients. A typical Telnet client is provided with the status of various protocol stacks, high and low level device drivers, various servers that are supported, system information, and configuring a device on a WAN port. A typical TCP/IP program group is shown below with a Tcpman icon and a Telnet icon.



For a detailed description of the RouteFinder100 software and individual parameters, refer to Chapter 5 in this manual.

The TCP/IP stack has to be loaded before the Telnet client can run. The Telnet client is a Windows 3.1 application. The Telnet Server option has to be selected from the Applications Setup dialog box using the Router Configuration icon. Double click on the Telnet icon and a blank Telnet screen is displayed. Click on Connection and a drop down menu is displayed. Click on Connect and the Connect to remote host dialog box is displayed.

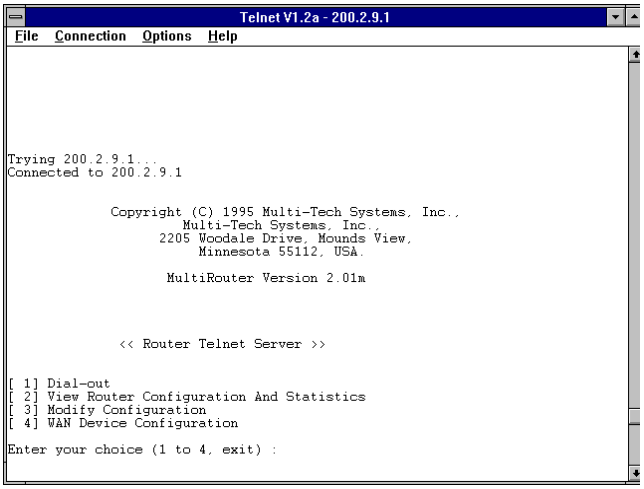
When the Connect to remote host dialog box is displayed, a Host address has to be entered. In this example, the IP Host address is 200.2.9.1.



When you enter a host address and click on the OK button, the Router Telnet Server menu is displayed.

8.3.1 Router Configuration

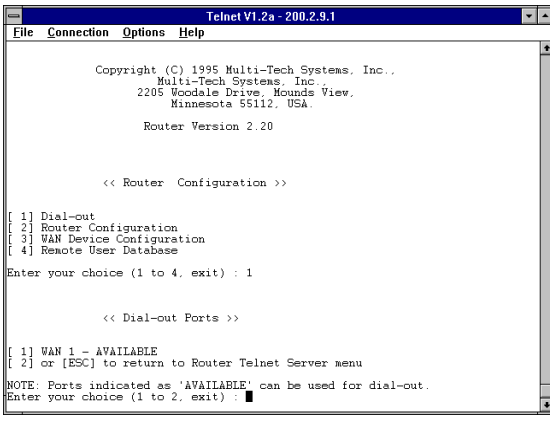
The Router Telnet Server menu provides four options; Dial-out, WAN Device Configuartion, and Remote User Database . The Dial-out options let you select either the default port configuration or you can select the various port parameters. The Router Configuration options allow you to select the protocol stack, high or low level device drivers, view system information, or configure a device on the WAN port.


Telnet V1.2a - 200.2.9.1
File Connection Options Help
Trying 200.2.9.1...
Connected to 200.2.9.1
Copyright (C) 1995 Multi-Tech Systems, Inc.,
Multi-Tech Systems, Inc.,
2205 Woodale Drive, Mounds View,
Minnesota 55112, USA.
MultiRouter Version 2.01m
<< Router Telnet Server >>
[1] Dial-out
[2] View Router Configuration And Statistics
[3] Modify Configuration
[4] WAN Device Configuration
Enter your choice (1 to 4, exit) :

Dial-Out

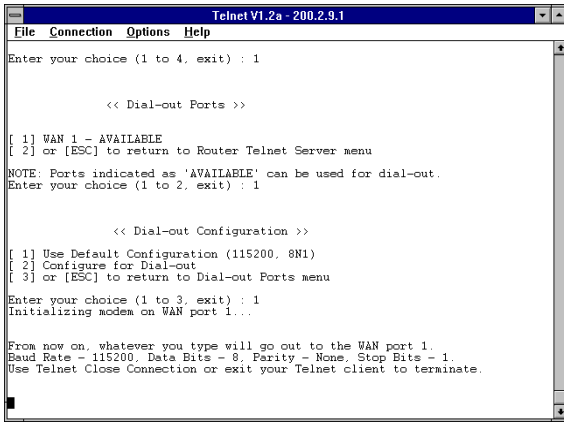
The Dial-out option allows a user to configure a WAN port for a dial-out session. When the session is complete, the WAN port reverts back to its original configuration. A default configuration of 115200 bps, 8N1 can also be selected for the dial-out session.

You can choose each parameter for the port (e.g., baud rate, stop bits, or parity). Connection to the WAN port can be accomplished either way. When the connection is made, what ever you enter on the keyboard is presented to the WAN port.


Telnet V1.2a - 200.2.9.1
File Connection Options Help
Copyright (C) 1995 Multi-Tech Systems, Inc.,
Multi-Tech Systems, Inc.,
2205 Woodale Drive, Mounds View,
Minnesota 55112, USA.
Router Version 2.20
<< Router Configuration >>
[1] Dial-out
[2] Router Configuration
[3] WAN Device Configuration
[4] Remote User Database
Enter your choice (1 to 4, exit) : 1
<< Dial-out Ports >>
[1] WAN 1 - AVAILABLE
[2] or [ESC] to return to Router Telnet Server menu
NOTE: Ports indicated as 'AVAILABLE' can be used for dial-out.
Enter your choice (1 to 2, exit) :

From the Dial-out ports menu, you can select an available WAN port, in this case WAN 1 port is available or you can return to the Router Telnet Server menu.

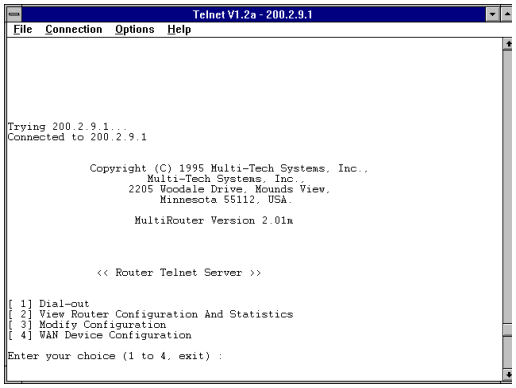
When you select option 1 (User Default Configuation 115200, 8N1) from the Dial-out Configuration menu, the WAN port is automatically configured to the default parameters. If you choose to configure the WAN port use option 2, or you can return to the dial-out ports menu. If you choose the default configuration, what ever is entered on the keyboard is presented to the WAN port.


Telnet V1.2a - 200.2.9.1
File Connection Options Help
Enter your choice (1 to 4, exit) : 1
<< Dial-out Ports >>
[1] WAN 1 - AVAILABLE
[2] or [ESC] to return to Router Telnet Server menu
NOTE: Ports indicated as 'AVAILABLE' can be used for dial-out.
Enter your choice (1 to 2, exit) : 1
<< Dial-out Configuration >>
[1] Use Default Configuration (115200, 8N1)
[2] Configure for Dial-out
[3] or [ESC] to return to Dial-out Ports menu
Enter your choice (1 to 3, exit) : 1
Initializing modem on WAN port 1...
From now on, whatever you type will go out to the WAN port 1.
Baud Rate - 115200, Data Bits - 8, Parity - None, Stop Bits - 1.
Use Telnet Close Connection or exit your Telnet client to terminate.

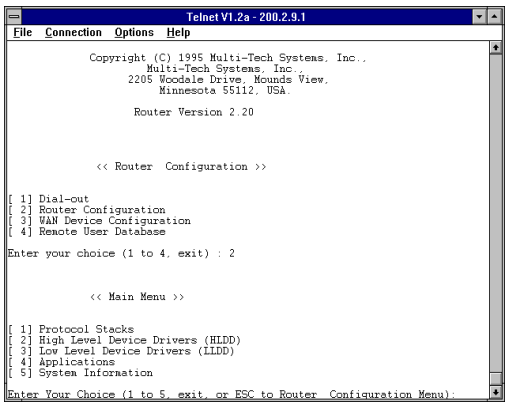
If you choose to configure the dial-out port (Option 2) from the Dial-out Configuration menu, you can select the baud rate, number of data bits, parity, and the number of stop bits.

Router Configuration

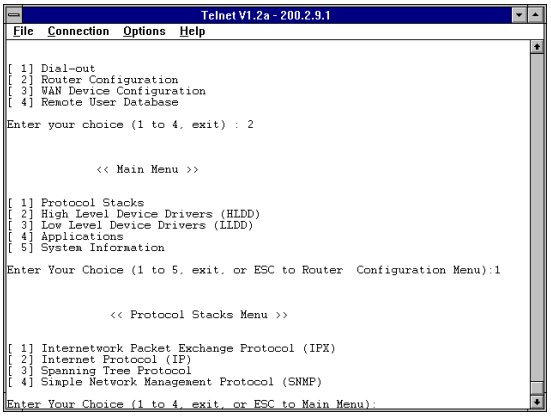
The Router Configuration option allows you to view and change parameters on the protocol stacks, high and low level device drivers, enable or disable the supported servers from a remote location or view system information. If the password option is enabled, you will be prompted for a password.


Telnet V1.2a - 200.2.9.1
File Connection Options Help
Trying 200.2.9.1...
Connected to 200.2.9.1
Copyright (C) 1995 Multi-Tech Systems, Inc.,
Multi-Tech Systems, Inc.,
2205 Woodale Drive, Mounds View,
Minnesota 55112, USA.
MultiRouter Version 2.01a
<< Router Telnet Server >>
[1] Dial-out
[2] View Router Configuration And Statistics
[3] Modify Configuration
[4] WAN Device Configuration
Enter your choice (1 to 4, exit) :

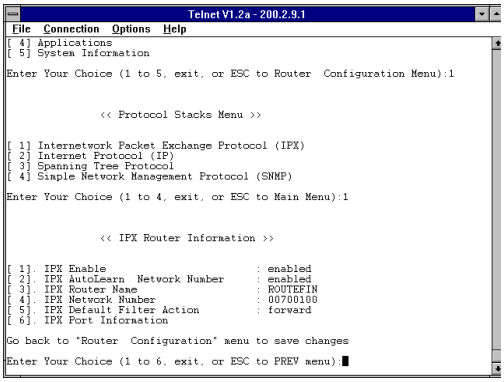
The Main Menu provides five options. The Main Menu is shown below. To select an option, enter the number of the option and hit the Enter key. For example, to select the Protocol Stacks option, enter 1 and hit the Enter key.


Telnet V1.2a - 200.2.9.1
File Connection Options Help
Copyright (C) 1995 Multi-Tech Systems, Inc.,
Multi-Tech Systems, Inc.
2205 Woodale Drive, Mounds View,
Minnesota 55112, USA.
Router Version 2.20
<< Router Configuration >>
[1] Dial-out
[2] Router Configuration
[3] WAN Device Configuration
[4] Remote User Database
Enter your choice (1 to 4, exit) : 2
<< Main Menu >>
[1] Protocol Stacks
[2] High Level Device Drivers (HLDD)
[3] Low Level Device Drivers (LLDD)
[4] Applications
[5] System Information
Enter Your Choice (1 to 5, exit, or ESC to Router Configuration Menu):

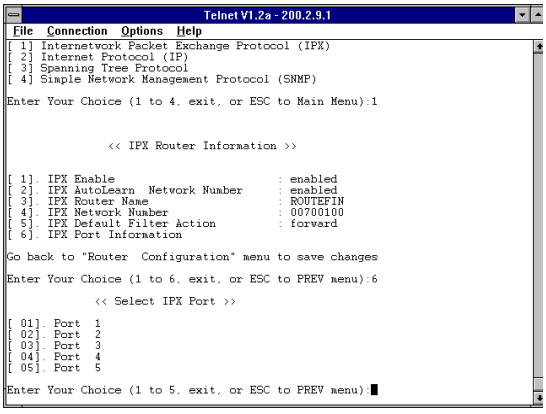
The Protocol Stack Menu is displayed with options for IPX, IP, Spanning Tree, SNMP, and returning to the Main Menu. To select a option, choose the number of the option and hit the Enter key. For example, if you wanted to look at IPX routing information, enter number 1 and hit the Enter key.


Telnet V1.2a - 200.2.9.1
File Connection Options Help
[1] Dial-out
[2] Router Configuration
[3] WAN Device Configuration
[4] Remote User Database
Enter your choice (1 to 4, exit) : 2
<< Main Menu >>
[1] Protocol Stacks
[2] High Level Device Drivers (HLDD)
[3] Low Level Device Drivers (LLDD)
[4] Applications
[5] System Information
Enter Your Choice (1 to 5, exit, or ESC to Router Configuration Menu):1
<< Protocol Stacks Menu >>
[1] Internetwork Packet Exchange Protocol (IPX)
[2] Internet Protocol (IP)
[3] Spanning Tree Protocol
[4] Simple Network Management Protocol (SNMP)
Enter Your Choice (1 to 4, exit, or ESC to Main Menu):

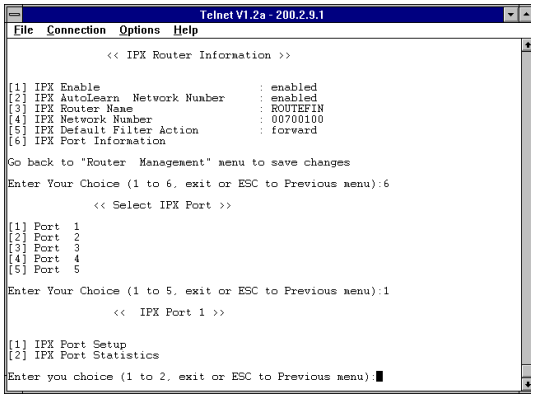
The IPX Router Information menu is displayed with options to enable or disable IPX, AutoLearn, change the Router Name, Network Number, etc.

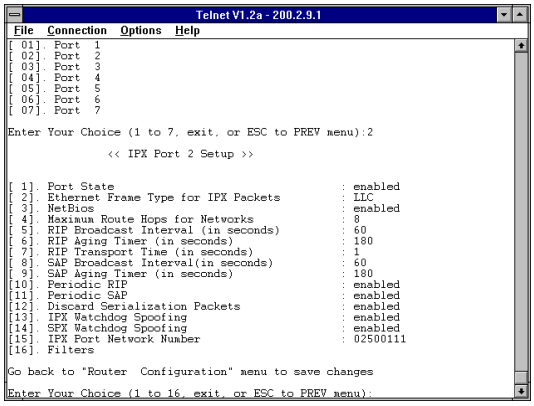

Telnet V1.2a - 200.2.9.1
File Connection Options Help
[4] Applications
[5] System Information
Enter Your Choice (1 to 5, exit, or ESC to Router Configuration Menu):1
<< Protocol Stacks Menu >>
[1] Internetwork Packet Exchange Protocol (IPX)
[2] Internet Protocol (IP)
[3] Spanning Tree Protocol
[4] Simple Network Management Protocol (SNMP)
Enter Your Choice (1 to 4, exit, or ESC to Main Menu):1
<< IPX Router Information >>
[1]. IPX Enable : enabled
[2]. IPX AutoLearn Network Number : enabled
[3]. IPX Router Name : ROUTEFIN
[4]. IPX Network Number : 00700100
[5]. IPX Default Filter Action : forward
[6]. IPX Port Information
Go back to "Router Configuration" menu to save changes
Enter Your Choice (1 to 6, exit, or ESC to PREV menu):

To view or change for example the parameters on a port, choose option 6 (IPX Port Information) and the Select IPX Port menu is displayed.


Telnet V1.2a - 200.2.9.1
File Connection Options Help
[1] Internetwork Packet Exchange Protocol (IPX)
[2] Internet Protocol (IP)
[3] Spanning Tree Protocol
[4] Simple Network Management Protocol (SNMP)
Enter Your Choice (1 to 4, exit, or ESC to Main Menu):1
<< IPX Router Information >>
[1]. IPX Enable : enabled
[2]. IPX AutoLearn Network Number : enabled
[3]. IPX Router Name : ROUTEFIN
[4]. IPX Network Number : 00700100
[5]. IPX Default Filter Action : forward
[6]. IPX Port Information
Go back to "Router Configuration" menu to save changes
Enter Your Choice (1 to 6, exit, or ESC to PREV menu):6
<< Select IPX Port >>
[01]. Port 1
[02]. Port 2
[03]. Port 3
[04]. Port 4
[05]. Port 5
Enter Your Choice (1 to 5, exit, or ESC to PREV menu):

Select a port form the menu, for example I selected port 2 and the IPX Port 2 Setup menu is displayed.

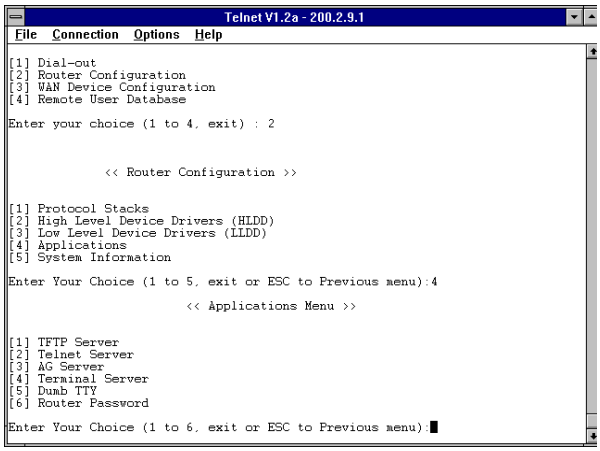

Telnet V1.2a - 200.2.9.1
File Connection Options Help
<< IPX Router Information >>
[1] IPX Enable : enabled
[2] IPX AutoLearn Network Number : enabled
[3] IPX Router Name : ROUTEFIN
[4] IPX Network Number : 00700100
[5] IPX Default Filter Action : forward
[6] IPX Port Information
Go back to "Router Management" menu to save changes
Enter Your Choice (1 to 6, exit or ESC to Previous menu):6
<< Select IPX Port >>
[1] Port 1
[2] Port 2
[3] Port 3
[4] Port 4
[5] Port 5
Enter Your Choice (1 to 5, exit or ESC to Previous menu):1
<< IPX Port 1 >>
[1] IPX Port Setup
[2] IPX Port Statistics
Enter you choice (1 to 2, exit or ESC to Previous menu):


Telnet V1.2a - 200.2.9.1
File Connection Options Help
[01]. Port 1
[02]. Port 2
[03]. Port 3
[04]. Port 4
[05]. Port 5
[06]. Port 6
[07]. Port 7
Enter Your Choice (1 to 7, exit, or ESC to PREV menu):2
<< IPX Port 2 Setup >>
[1]. Port State : enabled
[2]. Ethernet Frame Type for IPX Packets : LLC
[3]. NetBios : enabled
[4]. Maximum Route Hops for Networks : 8
[5]. RIP Broadcast Interval (in seconds) : 60
[6]. RIP Aging Timer (in seconds) : 180
[7]. RIP Transport Time (in seconds) : 1
[8]. SAP Broadcast Interval(in seconds) : 60
[9]. SAP Aging Timer (in seconds) : 180
[10]. Periodic RIP : enabled
[11]. Periodic SAP : enabled
[12]. Discard Serialization Packets : enabled
[13]. IPX Watchdog Spoofing : enabled
[14]. SPX Watchdog Spoofing : enabled
[15]. IPX Port Network Number : 02500111
[16]. Filters
Go back to "Router Configuration" menu to save changes
Enter Your Choice (1 to 16, exit, or ESC to PREV menu):

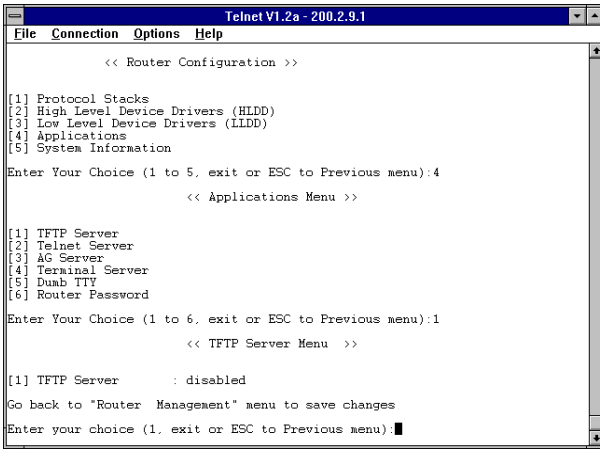
From the IPX Port Setup menu, the port parameters are displayed. To change a parameter, choose the option number and hit the Enter key. For details on a parameter, refer to Chapter 5 of this manual.

Applications

The Applications option from the Main Menu allows you to enable or disable various servers. Choosing the Applications option (Option 4) in the Main Menu displays the Applications Menu.


Telnet V1.2a - 200.2.9.1
File Connection Options Help
[1] Dial-out
[2] Router Configuration
[3] WAN Device Configuration
[4] Remote User Database
Enter your choice (1 to 4, exit) : 2
<< Router Configuration >>
[1] Protocol Stacks
[2] High Level Device Drivers (HLDD)
[3] Low Level Device Drivers (LLDD)
[4] Applications
[5] System Information
Enter Your Choice (1 to 5, exit or ESC to Previous menu):4
<< Applications Menu >>
[1] TFTP Server
[2] Telnet Server
[3] AG Server
[4] Terminal Server
[5] Dumb TTY
[6] Router Password
Enter Your Choice (1 to 6, exit or ESC to Previous menu):

The Applications menu displays six server options for your choice. To enable or disable a server, choose the server option number and hit the Enter key. Then choose either option 1 to enable the server or option 2 to disable the server.



The following is a description of each server and its use.

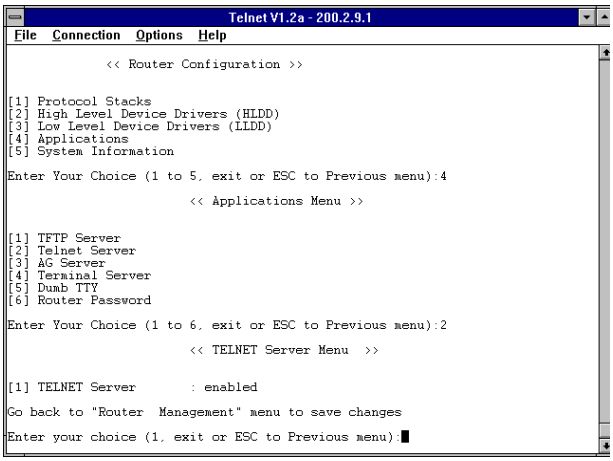
TFTP Server - The TFTP server is used for configuration and firmware updates across the IP internetwork. TFTP is a file transfer protocol that uses UDP and provides a simple method for transfering files between two nodes (the server and client).

Telnet Server - The Telnet server allows an authorized Telnet client to remotely access the Telnet server to dial out, view router configuration and statistics, or modify the router configuation, or remotely modify the user database.

Async Gateway (AG) Server - The Async Gateway server is a communications gateway for dial-up communications. The Telnet client can remotely gain access to the server and control the ports.

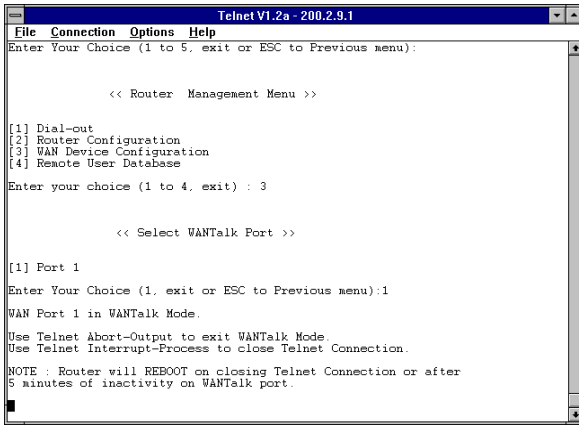
Terminal Server - The Terminal server allows an incoming call from a terminal (dumb or intelligent) to be connected to a telnet server.

Dumb TTY - The Dumb TTY allows a remote user to connect to the RouteFinder^{100}'s command port for configuation and management of the RouteFinder^{100}.



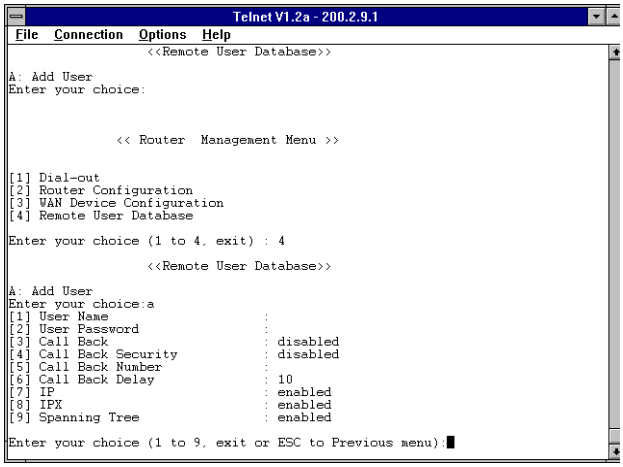
WAN Device Configuration

The WAN Device Configuration option (Option 3) allows a remote user to gain access to an available WAN port.



Remote User Database

The Remote User Database option (Option 4) allows a remote user to add user information such as name and password, callback information, and which protocol stack to have enabled or disabled.



RouteFinder 100™

Single WAN Multi-Protocol Router

Chapter 9 - Dial Out Client Software

MultiTech® Systems

9.1 Introduction

This chapter provides two methods for a user on a Novell network to dial out of the network using the modem in the MultiRouter. The two methods are: a software solution or a hardware solution for dialing out. The software solution is used in a Windows and DOS environment and the hardware solution is used in DOS applications requiring that the physical comm port be locally installed on the PC.

The software solution is Multi-Tech's Communication Services Interface (MCSI - pronounced Mik see) software redirector which complies with the MCSI/NCSI/NASI defacto standards for software redirection. MCSI provides the connectivity for a communications software program (like MultiExpress - Multi-Tech's data communications software) and MCSI is run prior to running a communicaitons software, such as MultiExpress.

Section 9.2 provides procedures for installing and using MCSI. Sections 9.2 thru 9.2.4 are procedures for installing and using MCSI in a DOS environment. Section 9.2.4 provides procedures for using MCSI as an INT14 software redirector (application specific Extended BIOS comm ports) that allows a workstation on a Novell network to operate with communications software that provides a network INT14 interface. Sections 9.2.5 and 9.2.6 provide procedures for installing and using the Windows version of MCSI (WINMCSI).

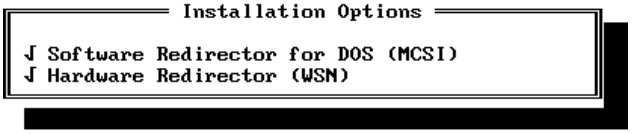
The hardware solution is having Multi-Tech's Hardware Redirector Card (model number RD301PC) installed in a workstation on the network and the WSN (Workstation Services Interface) hardware redirection software running on the workstation. The Hardware Redirector Card must be purchased separately.

Section 9.3 provides procedures for installing and using the WSN hardware redirection software. Section 9.3.1 provides the criteria that should be met before installation of the WSN hardware redirection software. Section 9.3.2 provides the procedures for installing the WSN hardware redirection software. Section 9.3.3 provides the procedures for the operation of WSN Pop Up TSR. Section 9.3.4 provides the procedures for the command line operation of the WSN in a DOS environment.

9.2 Installing MCSI

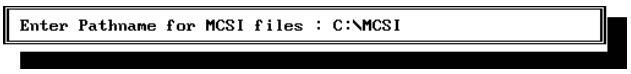
This procedure allows you to establish a connection between a client PC and the MultiRouter, after which you can run your communications software with a MCSI/NASI/NCSI compatible interface.

1. Power on your client PC and log in to your LAN
2. Insert the Dial Out Client diskette into your floppy disk drive. Change to your floppy disk drive, e.g., A:\, and type INSTALL.
3. The Installation Options Menu appears.



The checkmark in front of the options means that, by default, both options are selected for installation. If you want to install both MCSI and WSN, press Esc and go to step 4. If you only want to install MCSI, at this time, then you must highlight Hardware Redirector (WSN) and then press Enter to deselect it. Press Esc when you are ready to continue with the installation.

4. The Enter Pathname for MCSI files window appears. Press Enter to accept the default (C:\MCSI), or type in a different pathname and press Enter.



5. MCSI is installed in the designated directory. When the installation is complete, the message: "AsyncGateway MCSI Installation Complete" appears. Press any key to continue. The message: "Installation of client is completed" appears. Press any key to continue. You return to the DOS prompt.

9.2.1 Using the MCSI Software Redirector

1. Change to the subdirectory containing the MCSI files, e.g., C:\MCSI>.
2. Type **MCSIWSN** (the program name for the redirector software) and press Enter.

   Note: Use the -P parameter (i.e., MCSIWSN -P) to display the Inbound/Outbound Modem Type window later when you use MCSI with MultiExpress. For more information on MCSIWSN's command line parameter options see Section 9.2.2. For more information on using MCSI with MultiExpress see Section 9.2.3.

   This loads the redirector software. A message similar to the following appears:

```
C:\MCSI>mcsiwsn

MCSI  - Multi-Tech Communication Services Interface (IPX)  Vers
INT14 - Interrupt 14H Interface (IPX)
Copyright 1990-1995, Multi-Tech Systems, Inc.

Initializing, please wait...
MCSI Program is Resident.

C:\MCSI>
```

3. Type **LOGON** and press Enter. A message similar to the following appears:

```
C:\>logon

MCSI and INT14 Logon Program  Version 2.01
Copyright 1990-1992, MultiTech Systems, Inc.

Enter your user name:
```

   You can use a preferred communications server name if more than one communications server is on the network, e.g., logon server_1/user1.

4. Type **USER1** (or your valid MultiComRNGateway user name) and press Enter. If a password has been assigned, the following appears. (If a password was not assigned, then the screen in Step 8 appears.)

```
C:\>logon

MCSI and INT14 Logon Program  Version 2.01
Copyright 1990-1992, MultiTech Systems, Inc.

Enter your user name: user1
Enter your password:
```

5. Type **USER1** (or your valid MultiComRNGateway password) and press Enter. The following appears:

```
C:\>logon

MCSI and INT14 Logon Program  Version 2.01
Copyright 1990-1992, MultiTech Systems, Inc.

Enter your user name: user1
Enter your password:
Login Completed.

C:\>
```

6. You have now connected to the MultiRouter modem and can run any MCSI compatible software to establish a connection.

   At some point you may want to unload MCSI from memory. This is done by changing to the directory where MCSI is located, typing **MCSIWSN -U** and pressing Enter. MCSI will then unload from memory, provided that other TSR's have not been loaded after MCSI was loaded. If other TSR's have been loaded, then they must be unloaded in the reverse order of loading, before MCSIWSN can be unloaded.

9.2.2 MCSI Software Command Line Operation

MCSI command line parameters allow you to operate MCSI as an INT14 software redirector, make MCSI Novell NASI compatible, turn on the pop up Inbound Outbound Menu, select Inbound as default connection type, unload MCSI from memory, and enable the command interpreter option for application programs that make use of this option.

1. Login to your network.
2. Your LAN's communications link between the client PC and the MultiRouter was established by logging onto the LAN.
3. Change to the subdirectory containing the MCSI files.
4. Type **MCSIWSN ?** at the DOS prompt and press Enter. The following appears:

```
C:\MCSI>mcsiwsn ?

MCSI  - Multi-Tech Communication Services Interface (IPX)  Version 2.3
INT14 - Interrupt 14H Interface (IPX)
Copyright 1990-1995, Multi-Tech Systems, Inc.

Usage is:
    -U          For uninstalling this program.
    -F          If you want to search for active modem servers.
    -C          Turns on Command Interpreter option.
    -I          Connection Manager will connect as inbound.
    -P          Display Connection Manager popup.
    -N<1 to 9>  Number of multiple connections operational
                at the same time up to 9 (default = 1).
    -A          Load TSR as an INT14.
    -X          Novell NASI compatible.
    -M          Wait on specific line when it is inbound.
    -S<1 to 9>  Number of Servers to wait when it is inbound.

C:\MCSI>
```

When one or more parameters are typed following the MCSIWSN command, a space must be used to separate each parameter (e.g., MCSIWSN -I -P -N5). The parameters can be entered in any order.

-U MCSIWSN can be unloaded by changing to the directory containing the MCSI files and typing **MCSIWSN -U** (then pressing Enter).

-F This parameter searches for active modem servers.

-C This parameter enables the MCSI command interpreter option. An additional 5K of memory is used by MCSIWSN when invoked. It allows applications programs that provide a command interpreter interface to issue the following commands:

CONNECT, DISCONNECT, HELP, LIST, RESUME, SET, SHOW, SWITCH

-I Connection Manager connects as INBOUND. When setting up for INBOUND only connections adding this parameter string to the command removes the need for operator intervention to select INBOUND on the Connection Manager screen.

-P Adding this parameter to the command line turns on the connection manager pop up OUTBOUND/ INBOUND screen.

-N <1 to 9> This option determines the number of Multiple connections operational at the same time from 1 to 9 (default = 1). Increasing the number of Multiple connections expands the MCSIWSN memory requirement by up to 10K. To set the number of connections desired, type **MCSIWSN -Nx** (x = a number from 1 to 9) and press Enter.

-A Adding this parameter following MCSIWSN allows you to make MCSI an INT14 compatible interface, when the COMS14.EXE program is run after MCSIWSN -A. See the Section 5.6 of this chapter that explains using MCSI as an INT14 software redirector.

-X Adding this parameter after the MCSIWSN command makes MCSI compatible with Novell NASI based software

-M Adding this parameter after MCSIWSN allows you to wait on a specific line when it is in inbound mode

-S <1 to 9> This option allows the users to wait on multiple servers on the same network when it is in inbound mode. The number of servers available at the same time from 1 to 9 (default = 1).

5. Select the MCSI command line parameter options necessary for the client PC on which it will be run. Then type MCSIWSN followed by the selected parameter string.
6. After MCSIWSN has been started with its desired parameter string, and the “MCSI is Resident” message appears, LOGON to the RNS.
7. Type **LOGON** and press Enter. The following appears:

```
C:\>logon

MCSI and INT14 Logon Program  Version 2.01
Copyright 1990-1992, MultiTech Systems, Inc.

Enter your user name:
```

8. Type **USER1** or another valid user name and press Enter. If a password was assigned, the following appears: (If a password was not assigned, go on to Step 10.)

```
C:\>logon

MCSI and INT14 Logon Program  Version 2.01
Copyright 1990-1992, MultiTech Systems, Inc.

Enter your user name: user1
Enter your password:
```

9. Type **USER1** or the valid password for the user name entered and press Enter. The following appears:

```
C:\>logon

MCSI and INT14 Logon Program  Version 2.01
Copyright 1990-1992, MultiTech Systems, Inc.

Enter your user name: user1
Enter your password:
Login Completed.

C:\>
```

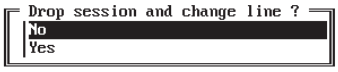
10. You have now connected to the MultiRouter modem and can run any MCSI compatible software to establish a connection.

9.2.3 Using MultiExpress with MCSI

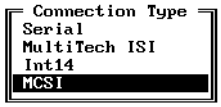
At this point you have run MCSIWSN according to the procedure in either Section 9.2.1 or 9.2.2. This section will indicate how to use MultiExpress to connect with the MultiRouter modem. It is assumed that MultiExpress has been installed on your client PC.

Note: Any LAN network communications software program with a MCSI compatible interface can be used to establish a session with the MultiRouter modem.

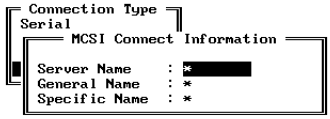
1. If MultiExpress has not been installed, then install it by placing the MultiExpress disk in the floppy drive, typing **MEINSTALL** and pressing Enter.
2. Run METERM by typing **METERM** and pressing Enter. The opening title Screen appears and then the main screen appears.
3. If the status line at the bottom of your screen indicates COM1 or a connection type other than MCSI. Then press ALT+L to pop up either the question shown below if a connection was active or the screen shown in step 4.

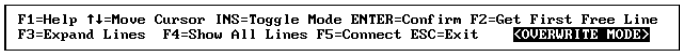


4. If a session was active drop the session by selecting "YES" and pressing Enter. The Connection Type Menu appears.

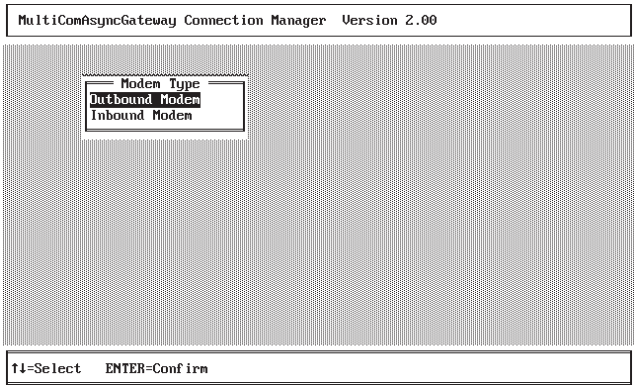


5. Select MCSI as your connection type by highlighting MCSI and pressing Enter. The following screen appears.





6. If the MultiRouter is the only communications server on your LAN, you can press F2 to connect to the MultiRouter modem. The Modem type OUTBOUND/INBOUND screen appears.



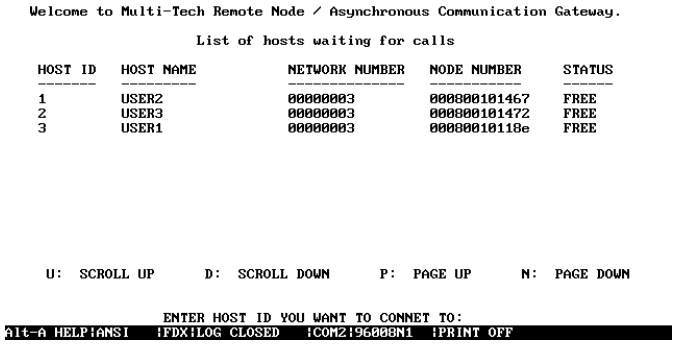
Note: This screen will not pop up if the MCSIWSN command line did not contain the -P parameter (display pop up). For more information on MCSIWSN's command line parameter options see the previous section in this chapter.

7. If you select an OUTBOUND modem, your dial-out session will operate as described in your communications software manual. Go to step 11 to complete this procedure.

   Note: OUTBOUND is selected for any of the following sessions: dial-out data communications, auto-answer data communications, send fax, and receive fax directly to your desk.

   OR

   If you select an INBOUND modem, run your communications software and wait for a dial-in call. All of your assigned lines will be monitored for a dial-in call. When a dial-in call is received, the following appears.


Welcome to Multi-Tech Remote Node / Asynchronous Communication Gateway.
List of hosts waiting for calls
HOST ID HOST NAME NETWORK NUMBER NODE NUMBER STATUS
1 USER2 00000003 000800101467 FREE
2 USER3 00000003 000800101472 FREE
3 USER1 00000003 00080010118e FREE
U: SCROLL UP D: SCROLL DOWN P: PAGE UP N: PAGE DOWN
ENTER HOST ID YOU WANT TO CONNET TO:
Alt-A HELP!ANSI !FDX!LOG CLOSED !COM2!96008N1 !PRINT OFF

8. You are asked to "ENTER HOST ID YOU WANT TO CONNECT TO?". Type in a HOST ID number (listed in the left-hand column).
9. You may be asked to enter a password (if there is one).
10. Upon receiving the user's valid password, you are connected to the HOST that was configured for the INBOUND session with the User Name and Password that was just verified. Your dial-in remote control session can now continue as described in the manual that accompanied your communications software.
11. When your session is concluded, use the disconnect modem feature on the communications program to free the modem and port for other users.

9.2.4 Using MCSI as an INT14 Software Redirector

MCSI has the option to be run on a workstation as an INT14 software redirector. This allows the MultiRouter to operate with communications software that provides a network INT14 interface.

This procedure is for users whose LAN PCs will be running a LAN "network" version of communications software, like MultiExpress for DOS, with an INT14 compatible interface. These criteria should be met before you begin this section:

- You have your MultiRouter User Name and Password assigned by the LAN System Manager or Administrator when the MultiRouter was installed.
- The MultiRouter and the client PC are properly connected to a LAN with IPX capability and you have access to a "network" version copy of dial-in or dial-out communications software with an MCSI compatible interface.

Note: INT14 used in Windows is not the same as a network INT14 and does not connect to the MultiRouter.

1. Power on your client PC and log in to your LAN
2. Change to the subdirectory containing the MCSI files, i.e., C:\MCSI>.
3. Type **MCSIWSN -A** and press Enter. This loads MCSI and allows it to operate as an INT14 redirector. A message similar to the following appears:

```
C:\>MCSIWSN -A

MCSI  - MultiTech Communication Services Interface (IPX)  Version 2.01
INT14 - Interrupt 14H Interface (IPX)
Copyright 1990-1992, MultiTech Systems, Inc.

Initializing, please wait...
INT14 Program is Resident.

C:\>
```

4. Type **LOGON** and press Enter and the following appears:

```
C:\>logon

MCSI and INT14 Logon Program  Version 2.01
Copyright 1990-1992, MultiTech Systems, Inc.

Enter your user name:
```

Note: If you have more than one RNS on your network and you are not listed as a user on every RNS then you must type the following: LOGON <communications server name>\<user name> i.e., LOGON SERVER_1\USER1.

5. Type **USER1** (or your valid MultiRouter user name) and press Enter. If a password has been assigned, the following appears. (If a password was not assigned, go to step 7.)

```
C:\>logon

MCSI and INT14 Logon Program  Version 2.01
Copyright 1990-1992, MultiTech Systems, Inc.

Enter your user name: user1
Enter your password:
```

6. Type **USER1** (or your valid MultiRouter password) and press Enter. The following appears:

```
C:\>logon

MCSI and INT14 Logon Program  Version 2.01
Copyright 1990-1992, MultiTech Systems, Inc.

Enter your user name: user1
Enter your password:
Login Completed.

C:\>
```

7. If the MultiRouter is the only communications server on your LAN, then type COMS14 -C COM<n> Outbound * * * (<n> is replaced by the number 1, 2, 3, or 4 which selects one of the COMS14 COM ports) or COMS14 -C COM<n> Outbound* * *and press Enter (Inbound or Outbound must be specified). This will connect you to the line on the MultiRouter.

   Note: If you have more than one communications server on your network go to step 9, which begins the discussion of the COMS14 command line parameters.

8. You have now connected to the MultiRouter and can run any INT14 compatible software. Follow the software's instructions to establish the software's INT14 connection to the MultiRouter modem.

9. The COMS14 command line parameters can be listed by typing **COMS14 ?** the following listing appears.

```
C:\>coms14 ?

Int14 Communication Services Program  Version 2.01
Copyright 1990-1992,  MultiTech Systems, Inc.

Usage : coms14  -l [Server Name]
                   (for listing services)
      : coms14  -c COM<n> <LineType> <SpecificName> <GeneralName> <ServerName>
                   (for establishing a connection)
      : coms14  -d COM<n>
                   (to disconnect)
      : coms14  -m (to list mapping of local COM ports to Network ports)

C:\>
```

   The command line parameters for COMS14 are explained below:

9a. **COMS14 -L [Server Name]**

   When **COMS14 -L** is entered a listing of available communications servers appears.

   OR

   When **COMS14 -L [Server Name]** is entered
   i.e., COMS14 -L SERVER_1, then a list of services at the specific server appears, similar to that shown below:

```
C:\>COMS14 -L SERVER_1

Int14 Communication Services Program  Version 2.01
Copyright 1990-1992,  MultiTech Systems, Inc.

List of services at the server SERVER_1

   GENERAL NAME       SPECIFIC NAME STATUS
 --------------  ------------------ ------
         MODEM               LINE1   FREE
C:\>
```

9b. **COMS14 -C *COM<n> <Line Type> <SpecificName> <GeneralName> <ServerName>*** (for establishing a connection).

   When **COMS14 -C COM<n>** (n = 1, 2, 3, 4) followed by its argument string is entered, it allows you to connect to one of the four COM ports (COM1, COM2, COM3, COM4) allowed by INT14 software. The arguments are defined as follows.

<Line Type> Identifies whether the session will be INBOUND or OUTBOUND. The position representing Line Type must be filled with either the word INBOUND, OUTBOUND or the * (wild card symbol) which indicates that the line type last selected by this user is to be used.

<SpecificName> Identifies the specific name assigned to the port on the MultiRouter. This position must contain either the specific name assigned to the MultiRouter port (i.e., the default specific name for port one is LINE1) or it must contain an asterisk * (wild card symbol) which indicates that the first available specific name is to be used. The specific name is used when one specific modem is to be used on a communications server.

<GeneralName> Identifies the general name assigned to the port on the MultiRouter. This position must contain either the general name assigned to the MultiRouter port (i.e., the default general name for port one is MODEM) or it must contain an asterisk * (wild card symbol) which indicates that the first available specific name is to be used. The general name is used when more than one style of modem is used on a communications server, i.e., a MT1432BA and a MT2834BA.

<ServerName> Identifies the server name assigned to the MultiRouter. This position must contain either the servers name assigned to the MultiRouter port (i.e., the default server name is SERVER_1) or it must contain an asterisk * (wild card symbol) which indicates that the first available server is to be used. The server name is used when more than one MultiRouter is on a network.

9c. **COMS14 -D COM<n>** (to disconnect)

When **COMS14 -D COM<n>** (n = 1, 2, 3, 4) is entered it allows you to disconnect from the COM port to which you were connected, i.e., COM1, COM2, COM3, or COM4.

```
C:\>COMS14 -D COM1

Int14 Communication Services Program  Version 2.01
Copyright 1990-1992,  MultiTech Systems, Inc.

Port is disconnected.

C:\>
```

9d. **COMS14 -M** (to list mapping of local COM ports to Network ports)
When **COMS14 -M** is entered it allows you to view which of the four COM ports (COM1, COM2, COM3, COM4) are already connect to by INT14 software.

```
C:\>COMS14 -M

Int14 Communication Services Program  Version 2.01
Copyright 1990-1992,  MultiTech Systems, Inc.

Mapping of logical COM ports to network ports

  LOCAL PORT    STATUS   GENERAL NAME       SPECIFIC NAME SERVER NAME
 ------------ --------- --------------  ------------------ ------------
        COM1      BUSY          MODEM               LINE1    SERVER_1
        COM2      FREE
        COM3      FREE
        COM4      FREE
C:\>
```

9.2.5 Installing and Configuring the WINMCSI Modem-Sharing Software

The WINMCSI modem-sharing software manages access to a MultiRouter for inbound and outbound calls. It allows Windows communications software packages that do not support INT6B or INT14 to connect to our gateways (e.g., MultiRouter). It also detects other compatible communications servers (e.g., MultiComAsyncGatewayII and MultiComRNGateway) on your network and displays the resources they provide to eligible LAN users.

To install WINMCSI, follow the steps below.

For Windows 3.1, Windows for Workgroups 3.11, or Windows95 users:

1. Power on your client PC and log in to your LAN.
2. Start Windows.
3. Insert the Dial Out Client diskette into your floppy disk drive.

For Windows 3.1 or Windows for Workgroups 3.11 users:

4a. From your Program Manager, click on File | Run.

4b. In the Command Line field, type **a:\install**. Click on OK.

4c. Go to step 5.

For Windows95 users:

4a. Click on Start.

4b. Go to Settings.

4c. Click on Control Panel.

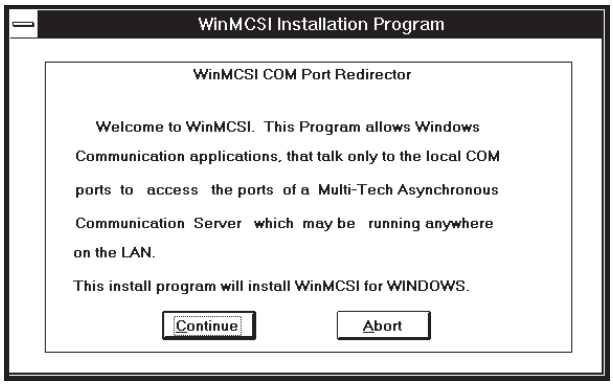
4d. Double-click on the Add/Remove Programs icon.

4e. The Install/Uninstall Program menu appears. Click on Install.

4f. Click on Next. If you want to install WINMCSI as a 32-bit program, then let Windows95 locate the proper **install.exe** file on the Dial Out Client disk in your floppy drive. If you want to install WINMCSI as a 16-bit program, then type **a:\winmcsi\install.exe**.

4g. Click on Finish.

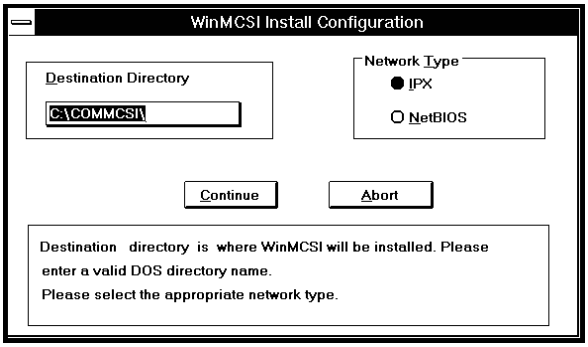
5. The WINMCSI Installation Program window appears.


WinMCSI Installation Program
WinMCSI COM Port Redirector
Welcome to WinMCSI. This Program allows Windows Communication applications, that talk only to the local COM ports to access the ports of a Multi-Tech Asynchronous Communication Server which may be running anywhere on the LAN.
This install program will install WinMCSI for WINDOWS.
Continue
Abort

6. Click in the Continue button if you want to continue with the WINMCSI installation, and continue with Step 7.

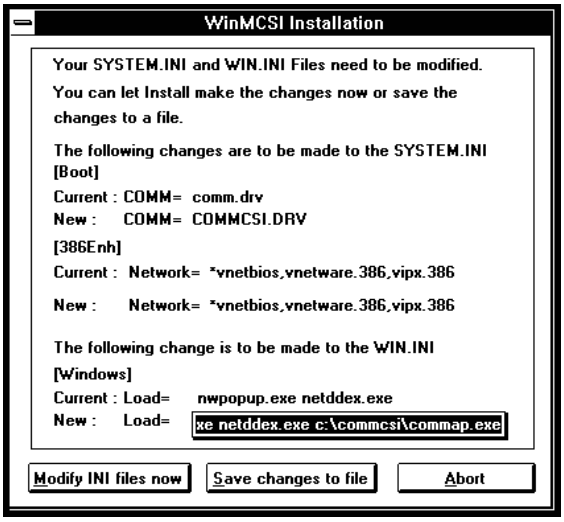
   Click on the Abort button if you do not want to install WINMCSI.

7. The WINMCSI Install Configuration window appears.



In the Destination Directory field, type in the name of the directory to which you want to install WINMCSI, or you can accept the default: C:\COMMCSI. In the Network Type box, select the appropriate network type. Click on the Continue button to continue with the WINMCSI installation.

8. When the Installing Multi-Tech WINMCSI window appears, click on the Install button.
9. When the installation is complete, the WINMCSI Installation window appears.

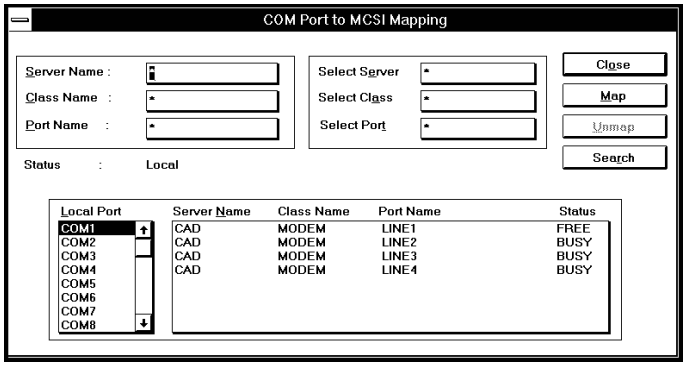

WinMCSI Installation
Your SYSTEM.INI and WIN.INI Files need to be modified.
You can let Install make the changes now or save the changes to a file.
The following changes are to be made to the SYSTEM.INI
[Boot]
Current : COMM= comm.drv
New : COMM= COMMCSI.DRV
[386Enh]
Current : Network= *vnetbios,vnetware.386,vipx.386
New : Network= *vnetbios,vnetware.386,vipx.386
The following change is to be made to the WIN.INI
[Windows]
Current : Load= nwpopup.exe netddex.exe
New : Load= xe netddex.exe c:\commcsi\commap.exe
Modify INI files now
Save changes to file
Abort

Click on the Modify INI Files Now button to have WINMCSI automatically make changes to your SYSTEM.INI and WIN.INI files.

Click on the Save Changes to File button to have WINMCSI make a copy of the changes to be made and store them in a file. You must make the changes before you can run WINMCSI. A screen appears later telling you your installation is complete and where your WIN.INI and SYSTEM.INI files are backed up.

10. The message: "Do you want to login to Multi-Tech Asynchronous Communication Server when WINDOWS comes up?" appears. Answer as appropriate.
11. The message: "Do you want to Map now?" appears. Click on Yes if you want to map your COM Ports now, go to step 12.

    Click on No if you want to wait to map your COM Ports when you start WINMCSI, go to step 13.
12. The COM Port to MCSI Mapping window appears.



If you want to get the first available line, click on the Map button and then click on the Close button and go to the next section.

If you want a specific line, click on a COM Port in the Local Port list box, then click on the line to which you want to map that particular COM Port. The status message "Mapped to MCSI" should appear above the Local Port list box.

Click on the Unmap button if you want to unmap a line.

Click on the Search button to search for lines on a server.

Click on the Close button when finished.

13. The message: "WINMCSI Successfully installed" appears. Click on OK.
14. A message appears telling you where your old SYSTEM.INI and WIN.INI files have been backed-up. The message also tells you to restart Windows. Click on the Restart Windows button.

9.2.6 Running the WINMCSI Workstation Software

WINMCSI has a workstation portion of the software that LAN users run and use to log onto the communications server prior to running datacomm software on their client PCs. The following steps guide you through this process.

For Windows 3.1, Windows for Workgroups 3.11 users:

1a. To start WINMCSI, double-click on the ComMap icon in your Program Manager in Windows. The ComMap for Windows window appears.

1b. Go to step 2.

For Windows95 users:

1a. To start WINMCSI, click on Start.

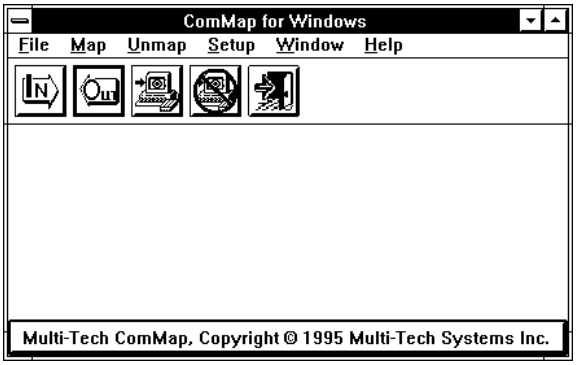
1b. Click on Programs.

1c. Click on MultiTech MCSI.

1d. Click on ComMap.

For Window 3.1, Windows for Workgroups 3.11, or Windows95 users:

2. The ComMap for Windows window appears.



3. To setup ComMap, click on the Setup menu.

   Click on the Network Type command. The Network Type dialog box appears. Your current network type is highlighted. You can change the network type by clicking on the option button appropriate for your network. Click on OK when finished. You must restart Windows if you change this setting.

   Note: Do not change the network type unless you have changed the network. Also, make sure that your SYSTEM.INI file contains the device drivers specific to the selected network type.

   Click on the Connect Timer command. The MCSI Connect Timer dialog box appears. The default value of the connect timer is shown in the Enter Connect Timer Value field. To change the value of the connect timer, type in a different value. Click on OK when finished.

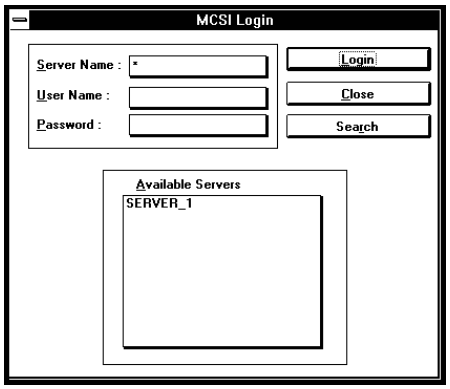
   Click on the Baud Change command. The ComMap Baud Change message appears. If baud change by an application is permitted, then this command is checked in the Setup Menu. If baud change is unchecked in the Setup Menu, then an application cannot change the baud rate (or other port parameters). Answer the message as appropriate.

   Click on the Default Login command. The Default Login Parameters dialog box appears. Use this dialog box to select a specific MultiRouter to which you want to log into next time Windows is loaded. Click on an MultiRouter from the Available Servers box. If there are no servers in the Available Servers box, then click on the Search button. Type in a User Name and Password (optional) in their respective fields. Click on OK when finished.

   ComMap saves these login parameters in your COMMCSI.INI file.

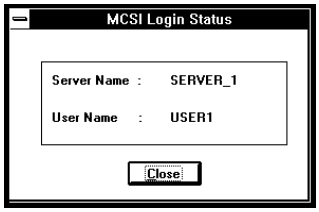
   Note: You cannot directly edit the COMMCSI.INI file using a text editor because the password field is encrypted.

4. If you have not logged into the network, do so now by clicking on File | Login, or click on the Login button (shown at left). The MCSI Login window appears.



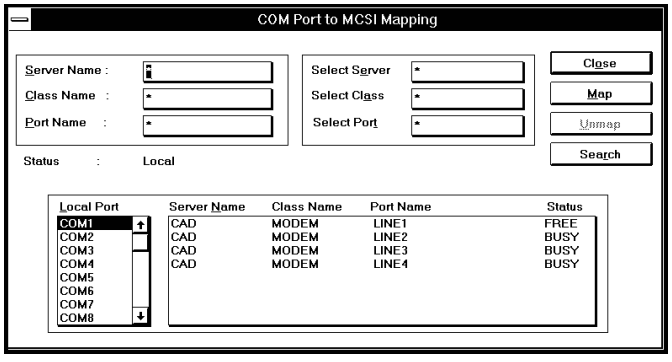
The Available Servers box lists the names of the available servers. Click on the name of the server to which you want to attach, type a User Name and Password in their respective fields, and then click on Login. A window appears stating that your login was successful. Click on OK. If there are no servers listed in the Available Servers box, then click on the Search button to search for a server.

5. At the ComMap for Windows main window, to view your log status, click on File | Log Status. The MCSI Login Status window appears.



This window shows the name of the server to which you are logged in and the name with which you logged in. Click on Close when you are finished.

6. At the ComMap for Windows main window, to map a COM port through MCSI, click on Map | Map. The COM Port to MCSI Mapping window appears.



Note: Windows95 users will have two additional buttons in this box, the Add Port and the Remove Port buttons. You must click on the Add Port button to view Local Ports. Click on the Remove Port button to remove Local Ports.

If you want to get the first available line, click on the Map button and then click on the Close button and go to step 7.

If you want a specific line, click on a COM Port in the Local Port list box, then click on the line to which you want to map that particular COM Port. The status message "Mapped to MCSI" should appear above the Local Port list box.

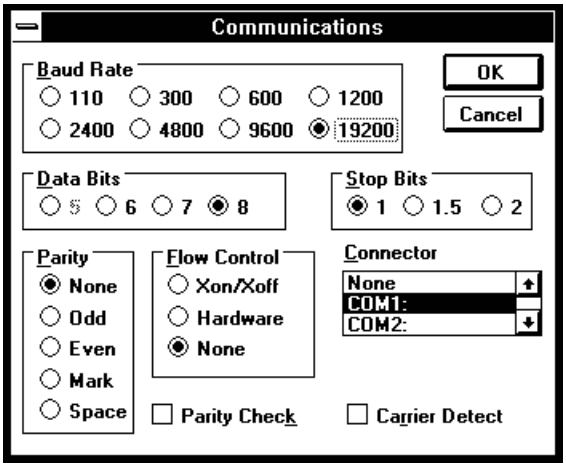
Click on the Unmap button if you want to unmap a line.

Click on the Search button to search for lines on a server.

Click on the Close button when finished.

7. To view a list of mapped COM ports, click on Map | Map List, or click on the Map button (shown at left). Click on Close when finished.

   Below is an example of the Window's Terminal application's (shipped with all versions of Windows) Communications dialog box. After mapping your COM Ports with ComMap for Windows, you can check your connectivity and configure your ports with Windows Terminal. It is recommended that you use the settings shown in the example below (in the example COM1 is shown).



8. To unmap a COM port, click on Unmap | Unmap, or click on the Unmap button (shown at left). Click on the listing you want to unmap and then click on Unmap.
9. To logout from the network, click on File | Logout, or click on the Logout button (shown at left).
10. To exit from WINMCSI, click on File | Exit, or click on the Exit button (shown at left). Otherwise you may minimize the screen to minimize WINMCSI to an icon.

9.3 Introduction to WSN Hardware Redirection

Section 9.3 provides: an explanation of our WSN hardware redirection software, a summary of WSN hardware redirector software installation, and procedures to connect a client PC to the MultiRouter modem. The client PC communications server connection allows you to establish dial-in or dial-out communications sessions with "off-the-shelf" communications software, just as though a modem were connected directly to your client PC.

Our WSN hardware director software works with our hardware redirector card (RD301PC). Our RD301PC hardware redirector card must be purchased separately. More information on our RD301PC is presented at the end of this section.

Hardware redirection is a means of allowing communications software that only operates through COM ports (COM1 to COM4) to connect over a LAN to the MultiRouter modem. A hardware redirector is a card that appears to the communications software as a standard COM port. However, it does not transfer the data from the communications software directly to the modem as a standard COM port would. The hardware redirector has additional circuitry and special software, called WSN (Workstation Services Interface). WSN "redirects" the data to the client PC's NIC (network interface card) and out over the LAN to the MultiRouter modem.

WSN is a loadable/unloadable Terminate and Stay Resident (TSR) software program. It can be left resident in the client PC's memory for faster connections between the communications software and the MultiRouter. Or it can be unloaded from memory after the completion of a communications session, freeing memory space for other programs.

When resident, WSN uses approximately 35K of memory. With some applications, it may be desirable to unload the resident program to free memory. It can be unloaded by changing to the directory where it is located, typing **WSN -U** and pressing Enter. If other TSR's have been loaded they must be unloaded in the reverse order that they were loaded, before WSN can be unloaded. WSN can also be started from the DOS prompt, if the client PC's AUTOEXEC.BAT PATH statement includes the directory where WSN is installed. For more information on the PATH statement, refer to your DOS manual.

WSN is executed after logging on to the LAN and before executing a standard "off-the-shelf" communications program.

Our RD301PC hardware redirector card must be purchased separately from the MultiComRNGateway product. Refer to the RD301PC's owner's manual for more information on it's installation. The RD301PC is configured to operate as a standard COM port, COM1 to COM4. They must NOT be set to the same COM port address and IRQ as ports which are already being used in the client PC.

9.3.1 WSN Hardware Redirection Criteria

The following criteria should be met before you start the installation of the WSN hardware redirector software:

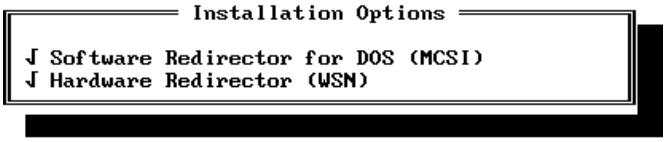
- You have your MultiRouter User Name and Password assigned by the System Administrator when the MultiRouter was installed.
- The MultiRouter and the client PC are properly connected to a LAN with IPX capability and you have a copy of a dial-in or dial-out communications software program such as MultiExpress.
- You have written down the switch settings on the RD301PC used in your client PC. These settings define the base I/O address for the COM Port, the IRQ for the COM port and the IRQ for the RD301PC.

  Note: Your RD301PC was shipped with the following default settings: Communications Software using COM 3, Base I/O Address 3E8h, and IRQ4. Redirector software, no COM Port designation required, Base I/O Address 100h and IRQ7.

  If you do not want to use WSN as a pop-up TSR program, see Section 9.3.4 for Command Line Operation of WSN.

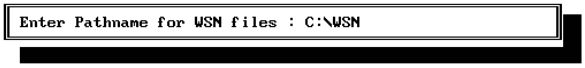
9.3.2 Installing the WSN Hardware Redirector Software

1. Power on your client PC and log in to your LAN
2. Insert the workstation diskette into your floppy disk drive. Change to your floppy disk drive, e.g., A:\, and type INSTALL.
3. The Installation Options Menu appears.



The checkmark in front of the options means that, by default, both options are selected for installation. If you want to install both MCSI and WSN, press Esc and go to step 4. If you only want to install WSN, at this time, then you must highlight Software Redirector for DOS (MCSI) and then press Enter to deselect it. Press Esc when you are ready to continue with the installation.

4. The Enter Pathname for WSN files window appears. Press Enter to accept the default (C:\WSN), or type in a different pathname and press Enter, then press Esc.



5. WSN is installed in the designated directory. When the installation is complete, the message: "AsyncGateway WSN Installation Complete" appears. Press any key to continue. The message: "Installation of client is completed" appears. Press any key to continue. You return to the DOS prompt.

9.3.3 Operation of the WSN Pop Up TSR

1. Power on your client PC and login to your LAN.
2. Your LAN's communication link between the client PC and the MultiRouter was established by logging onto the LAN.
3. If you are operating from a hard disk go on to Step 5. If you are operating from a floppy disk, insert the Dial Out Client diskette into a disk drive and change the DOS prompt to indicate that drive.
4. Type **CD WSN** and press Enter. This will change the directory to the WSN directory.

   OR

   If you have copied the WSN files to the client PC's hard disk, change to the subdirectory containing the WSN files.
5. If the RD301PC was installed in your client PC with the factory default settings unchanged, you can type **WSN** and press Enter. This executes the WSN redirector software, then go to Step 7. If the settings were changed go to Step 6.
6. If changes were made to your RD301PC's factory default settings (listed below), a parameter string must be included after typing **WSN** and before pressing Enter.

   When the parameter string is added to the WSN command, the line should be in the following form:

   WSN -it**x** -b**yyy** -c**z**

   WSN default is: -it7 -b100 -c3

   The **x**, **yyy** and **z** values are taken from the settings of the DIP switches and/or jumpers of the RD301PC at each client PC.

   x is equal to the setting of DIP Switches 1-6 on Switch Bank #3.

   yyy is equal to the setting of DIP Switch Bank #2

z is the number of the COM Port selected for the redirector board COM1 - COM4 determined by the setting of DIP Switches 7 and 8 on Switch Bank #3, and Switch Bank #1.

7. After typing **WSN** and entering the proper parameter string, the message: "Redirector Program is resident" appears.

8. Press CTRL+F10 to pop up the Main Menu.

   Note: This is the Main Menu for the interface to the MultiRouter. Operations made from this menu must be initiated in a sequence each time the client PC is powered up. Steps 10 - 14 will illustrate this important sequence.

9. Highlight the “Select Server” entry and press Enter. The List of Servers screen appears.

10. Highlight a server name and press Enter. The Main Menu appears.

11. Highlight “Logon” and press Enter. The Logon screen appears.

12. Type in your user name and press Enter. If a password was assigned, you will need to type it in the Logon screen. (If a password was not assigned the Main Menu appears. Go to Step 14.)

13. Type in your password and press Enter. The Main Menu appears.

14. Highlight List Services and press Enter. The List of Services at server: screen appears.

    The following is an explanation of each field displayed on the server screen.

    LINE NAME This field identifies the line configured on the MultiRouter by the assigned name. The default line name is LINE1.

    LINE TYPE This field identifies the default line connection specified in your MultiRouter configuration. This field changes as connections are made. The two possible line types are INBOUND and OUTBOUND.

    ACCESS This field identifies the line the user is allowed to access on the MultiRouter.

    STATUS This field identifies when a line connection is active, the line is indicated as “BUSY.” When a line is set to “INBOUND”, the status is “FREE” until the “Dial-In” session is established.

    USER NAME This field identifies the name of the user with a connection established to that line. Note that a line set for “INBOUND” will not display a user name until the remote connection is established.

    PARAMETERS This field identifies the Baud Rate, Parity, Start Bits, and Stop Bits for an active line connection.

15. Press Esc to return to the Main Menu.

16. You can now make a connection to establish a communications session. Highlight “Connect” and press Enter. The Modem Type screen appears.

17. Highlight Outbound Modem or Inbound Modem and press Enter. The Connection Menu for Server window appears. The List of Services at server: screen appears.

18. Highlight one of the Line Name entries and press Enter to make the connection. You should see a connection successful message at the bottom of your screen.

19. Press any key to return to the Main Menu.

20. To review or change the default parameters for your current communications session, highlight Parameters on the Main Menu and press Enter. The Parameters screen appears.

    If review or changes are not required go to step 21.

    Note: The parameters displayed are the current settings selected when your System Administrator installed the MultiRouter. Any changes made to this screen now are for the duration of the current connection only. When you terminate the MultiRouter connection, the settings will revert to the previously established settings at the MultiRouter.

21. Highlight the parameter entry to be changed and press the Space Bar repeatedly to scroll through the options. Press Enter to confirm your selection and return to the Main Menu. Repeat this procedure until you have completed setting the parameters.

The following is an explanation of each field on the screen.

BAUD This field identifies the default baud rate setting for the MultiRouter modem. The available baud rates are 150, 300, 600, 1200, 2400, 4800 9600 and 19,200 bps.

DATA BITS This field identifies the number of data bits for each byte transmitted by the MultiRouter modem. The selections are 5, 6, 7 or 8 data bits.

STOP BITS This field identifies the number of stop bits used by the MultiRouter modem. The selections are 1 or 2 stop bits.

PARITY This field identifies the parity type active for the MultiRouter modem. The selections are NONE, ODD and EVEN.

PACKET TIME This field identifies the number of 50 millisecond intervals that elapse prior to sending data from the client PC to the MultiRouter. The default setting is 2, which equals 100 milliseconds. The range of values is from 0-20. A setting of 0 causes a packet to be filled with 256 characters prior to transmitting to the MultiRouter. The screen indicates this until the packet is transmitted. Characters are not displayed on the screen; the MultiRouter echoes the characters back to the client PC upon receiving them.

22. Press Esc to return to the DOS prompt.

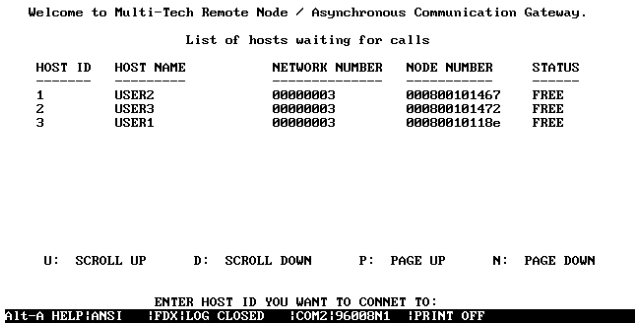
    Note: The communications software you are using should be set for the active port to be COM 3 with a base I/O address of 3E8h and IRQ4.

23. If you selected an OUTBOUND modem, this procedure is complete. Run your communications software, COM port = COM3, to begin a dial-out session as described in your communications software manual.

    OR

    If you selected an INBOUND modem, run your communications software, COM port = COM3, and wait for a dial-in call. All of your assigned lines will be monitored for a dial-in call. When a dial-in call is received, the following screen appears:

    Note: If you are using MultiExpress or another communications software for a remote control for dial-in operation, the Host software must be set to use Manual Modem as the modem type for your connection.


Welcome to Multi-Tech Remote Node / Asynchronous Communication Gateway.
List of hosts waiting for calls
HOST ID HOST NAME NETWORK NUMBER NODE NUMBER STATUS
1 USER2 00000003 000800101467 FREE
2 USER3 00000003 000800101472 FREE
3 USER1 00000003 00080010118e FREE
U: SCROLL UP D: SCROLL DOWN P: PAGE UP N: PAGE DOWN
ENTER HOST ID YOU WANT TO CONNET TO:
Alt-A HELP¦ANSI ¦FDX¦LOG CLOSED ¦COM2¦9600BN1 ¦PRINT OFF

24. You are asked to "ENTER HOST ID YOU WANT TO CONNECT TO?". Type in a HOST ID number (listed in the left-hand column).

25. Type in a user name. You are allowed five attempts to enter a valid user name before you are disconnected.

26. Upon receiving the valid user name, (the user must be access-approved for the INBOUND call), you may be asked to enter the user's password.

27. Upon receiving the user's valid password, you are connected to the client PC configured for the INBOUND session. This procedure is now complete. Your dial-in session can now continue as described in your communications software manual.

9.3.4 Command Line Operation of WSN

WSN is executed after logging on to the LAN and before running the communications software. The following procedure explains how to operate WSN from the DOS prompt.

Note: This procedure assumes that all default MultiRouter and client PC parameters are used.

1. Power on your client PC and login to your LAN.
2. If your LAN's communications link between the client PC and the MultiRouter was established by logging onto the LAN, proceed to step 4.
3. If you are operating from a hard disk go on to Step 4. If you are operating from a floppy disk, insert it into a disk drive and change the DOS prompt to indicate that drive.
4. If you have copied the WSN files to the client PC's hard disk, change to the subdirectory containing WSN.

   OR

   If you are operating from a floppy disk, type **CD WSN** and press Enter. This will bring you to the WSN directory.
5. Type **WSN ?** at the DOS prompt and press Enter. The following information appears:

   Usage is:

wsn-IT<1 to 7>	**For specifying IRQ level used by this program.**
-C<1 to 4>	**For specifying COM Port used by application.**
-B<address>	**For specifying I/O address used by this program.**
-U	**For uninstalling this program.**
-F	**If you want to search for active modem servers.**

   When multiple parameters are to be used following the WSN entry, a space must be used to separate each parameter (e.g., WSN -U -F). The parameters can be entered in any order.

   -IT<1 to 7> This parameter indicates the IRQ being used by the RD301PC and WSN. The default is IRQ7. When a setting other than the default is used, -IT**x** (X=number) must be changed so that **x** represents the IRQ for the RD301PC. This value must be changed if another piece of hardware or software on the client PC already uses it.

   -C<1 to 4> This indicates the COM Port used by the communications program. The default is COM Port 3. When another setting is used, the -c**z** must be changed so that **z** is a number from 1 to 4 (representing the COM Port). Again, the setting should be changed only if another piece of hardware or software already uses the default setting.

   -B<address> This indicates the base I/O address used by WSN, which exchanges data with the MultiRouter. The default is 100h. When another setting is used, -b**yyy** must by changed so that **yyy** represents the hex base address selected from the new switch settings. Refer to the RD301PC Redirector Hardware Installation Owner's Manual for switch settigs. This value can be changed if another piece of hardware or software on the client PC is already using the default setting.

   -U WSN can be unloaded by changing to the directory containing the WSN files and typing **WSN -U**, and pressing Enter.

   -F The -F parameter searches for an active modem server. This parameter is useful when batch files are used to automate login to a MultiRouter.
6. Type **WSN** at the DOS prompt and press Enter. This loads WSN used with the command line program "COMSERV." The message: "Redirector Program is Resident." appears.
7. The client PC is now ready to respond to the COMSERV.EXE program. This provides DOS line commands to connect to services on an MultiRouter.
8. Type **COMSERV ?** at the DOS prompt and press Enter. The message: "Enter User Name" appears.
9. Type **USER1** or another valid user name at the prompt and press Enter.

10. If a password was assigned, type **USER1** or the appropriate password and press Enter. The following appears:

```
C:\WSN>COMSERV ?

MultiComAsyncGateway Communication Services Program  Version 2.01
Copyright 1990-1992,  MultiTech Systems, Inc.

Enter user Name : USER1
Enter Password :
Usage : comserv -l [Server Name]
                (for listing services)
      : comserv -c <LineType> <SpecificName> <GeneralName> <ServerName>
                (for establishing a connection)
      : comserv -p B<baud rate>
                D<6, 7 or 8> data bits
                S<1 or 2>    stop bits
                P<O, E or N> parity
                TP<0 to 20>  interpacket timer
                L<1 to 255>  packet size
                (for changing connection parameters)
      : comserv -d (to disconnect)

C:\WSN>
```

-l (Lower case L) This parameter lists services available on the MultiRouter.

[ ] means specified entry is optional.

1) Typing **COMSERV -l** lists the available RNSs on your network.

2) Typing **COMSERV -l SERVER_1** (or the new MultiRouter name) lists the services available on the MultiRouter.

-c Establishes a connection.

<> means an entry is required when this option is used in the command line.

<Line Type> A Line Type must be specified (INBOUND or OUTBOUND).

<Specific Name> A Specific Name must be specified (a list of specific names on an MultiRouter can be obtained using the COMSERV -l command). The wildcard character * can also be used. It selects the first available line on an MultiRouter, or in the case of an INBOUND connection, all the lines configured for a user are monitored for an incoming call.

<General Name> A General Name must be specified (a list of general names on an MultiRouter can be obtained using the COMSERV -l command). The wildcard character * can also be used to allow any general name to be accepted.

<Server Name> A Server Name must be specified. (a list of Server Names can be obtained by using the COMSERV -l command). The wildcard character * can also be used to select the first RNS detected by the COMSERV program.

Note: When a specific name is entered, the general name and server name associated with it must either be entered or have a wildcard character in place of them.

-P Allows line parameters to be changed.

<> means an entry is required when this option is used in the command line.

B B, followed by a value representing a valid bps (bits per second), changes the bps rate. Values are 300, 600, 1200, 2400, 4800, 9600, and 19,200 bps.

D D, followed by the number 6, 7, or 8, changes the number of data bits used.

S S, followed by the number 1 or 2, changes the number of stop bits used.

P P, followed by O (odd), E (even), or N (none), changes the parity being used to that specified.

TP TP, followed by a number between 0 - 20, changes the number of 50 millisecond intervals before the packet is sent to the MultiRouter. The recommended value is 2. An entry of 0 causes it to wait until the packet has filled, prior to sending it to the MultiRouter (255 characters or the value specified using the L feature below). If a packet fills before the time expires, it is sent to the MultiRouter. This value can be used to facilitate file transfers.

Note: Characters are not displayed on the client PC screen until they are echoed back from the MultiRouter. Changing this interval time may cause the screen to appear slow to respond.

L L, followed by a number from 1 - 255, changes the packet size being sent to the MultiRouter. This value is dynamic, determined by the TP interval set above. This value can be used to facilitate file transfers.

-d This disconnects current User Line connections. All server values return to the installation configuration parameters.

11. Type **COMSERV -L** at the DOS prompt. The message: "The following MultiTech Modem Servers are active:" appears.
12. Type **COMSERV -L SERVER_1** at the DOS prompt and the following appears:

```
C:\WSN>COMSERV -L SERVER_1

MultiComAsyncGateway Communication Services Program  Version 2.01
Copyright 1990-1992,  MultiTech Systems, Inc.

                LINE NAME LINE TYPE   ACCESS STATUS       USER NAME  PARAMETERS
  ---------------------- ---------  ------- ---------------------- -----------
          MODEM    :LINE1  OUTBOUND  ALLOWED  FREE

C:\WSN>
```

13. Either an OUTBOUND (dial-out) or an INBOUND (dial-in) connection can be established. To make an OUTBOUND connection go to step 14. To make an INBOUND connection go to step 17.
14. At the DOS prompt type **COMSERV -c OUTBOUND * * *.** This establishes an OUTBOUND connection. The message: "You are connected to MODEM:" appears.

    Note: The * * * following the word OUTBOUND in the command are wildcard characters. They select the first available modem from the first available RNS. The COMSERV command parameter strings are explained in step 10.)
15. To verify the connection, type **COMSERV -l SERVER_1** at the DOS prompt. The following appears:

```
C:\WSN>COMSERV -L SERVER_1

MultiComAsyncGateway Communication Services Program  Version 2.01
Copyright 1990-1992,  MultiTech Systems, Inc.

                LINE NAME LINE TYPE   ACCESS STATUS       USER NAME  PARAMETERS
  ---------------------- ---------  ------- ---------------------- -----------
          MODEM    :LINE1  OUTBOUND  ALLOWED  BUSY             USER1 19200,N,8,1

C:\WSN>
```

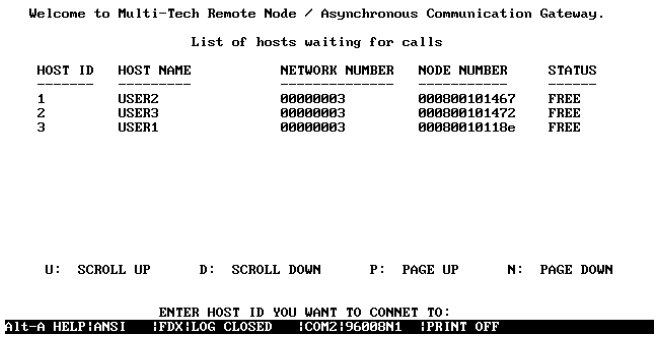
16. A connection is now established. A dial-out operation can be performed using MultiExpress or another “off-the-shelf” communications program (must be configured for the COM port represented by the redirector card). When the communications session is completed go to step 23.
17. At the DOS prompt type **COMSERV -c INBOUND * * *.** This establishes an INBOUND connection. A message similar to the following appears:

```
C:\WSN>COMSERV -C INBOUND * * *

MultiComAsyncGateway Communication Services Program  Version 2.01
Copyright 1990-1992,  MultiTech Systems, Inc.

You are waiting for call on the following lines:
MODEM    :LINE1 on server SERVER_1

C:\WSN>
```

    Note: The * * * following the word INBOUND in the command are wildcard characters. The COMSERV command parameter strings are explained in step 10.
18. All of your assigned lines will be monitored for a dial-in call by Connection Manager. A remote control software can now be run on the client PC to wait for connection to the dial-in call.

    Note: If you are using MultiExpress or another communications software for a remote control for dial-in operation, the Host software must use the Manual Modem Mode for your connection.

19. When a dial-in call is received, the following screen appears (to the remote user).


Welcome to Multi-Tech Remote Node / Asynchronous Communication Gateway.
List of hosts waiting for calls
HOST ID HOST NAME NETWORK NUMBER NODE NUMBER STATUS
1 USER2 00000003 000800101467 FREE
2 USER3 00000003 000800101472 FREE
3 USER1 00000003 00080010118e FREE
U: SCROLL UP D: SCROLL DOWN P: PAGE UP N: PAGE DOWN
ENTER HOST ID YOU WANT TO CONNET TO:
Alt-A HELP¦ANSI ¦FDX¦LOG CLOSED ¦COM2¦9600BN1 ¦PRINT OFF

20. You are asked to "ENTER HOST ID YOU WANT TO CONNECT TO?". Type in a HOST ID number (listed in the left-hand column).
21. You will be asked to enter a user name. You are allowed five attempts to enter a valid user name before you are disconnected.
22. Upon receiving the user's valid password, you are connected to the client PC configured for the INBOUND session. Your dial-in session can now continue as described in your communications software manual.
23. On the completion of the dial-out or dial-in operation, type **COMSERV -D** to free the modem and port for other users. A message: "Port is Disconnected" appears.

RouteFinder 100™

Single WAN Multi-Protocol Router

Chapter 10 - Warranty, Service and Technical Support

MultiTech® Systems

10.1 Introduction

This chapter starts out with statements about your RouteFinder100 2-year warranty. The next section, Tech Support, should be read carefully if you have questions or problems with your RouteFinder100. It includes the technical support telephone numbers, space for recording your product information, and an explanation of how to send in your RouteFinder100 should you require service. The final three sections explain how to use our bulletin board service (BBS), and get support through CompuServe and the Internet.

10.2 Limited Warranty

Multi-Tech Systems, Inc. ("MTS") warrants that its products will be free from defects in material or workmanship for a period of two years from the date of purchase, or if proof of purchase is not provided, two years from date of shipment. MTS MAKES NO OTHER WARRANTY, EXPRESSED OR IMPLIED, AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. This warranty does not apply to any products which have been damaged by lightning storms, water, or power surges or which have been neglected, altered, abused, used for a purpose other than the one for which they were manufactured, repaired by the customer or any party without MTS's written authorization, or used in any manner inconsistent with MTS's instructions.

MTS's entire obligation under this warranty shall be limited (at MTS's option) to repair or replacement of any products which prove to be defective within the warranty period, or, at MTS's option, issuance of a refund of the purchase price. Defective products must be returned by Customer to MTS's factory transportation prepaid.

MTS WILL NOT BE LIABLE FOR CONSEQUENTIAL DAMAGES AND UNDER NO CIRCUMSTANCES WILL ITS LIABILITY EXCEED THE PURCHASE PRICE FOR DEFECTIVE PRODUCTS.

10.2.1 On-line Warranty Registration

To register your ProxyServer on-line, go to the following link:

http://www.multitech.com/support/register.htm

10.3 Tech Support

Multi-Tech has an excellent staff of technical support personnel available to help you get the most out of your Multi-Tech product. If you have any questions about the operation of this unit, call 1-800-972-2439. Please fill out the RouteFinder100 information (below), and have it available when you call. If your RouteFinder100 requires service, the tech support specialist will guide you on how to send in your RouteFinder100 (refer Section 10.3.2).

10.3.1 Recording RouteFinder100 Information

Please fill in the following information on your Multi-Tech RouteFinder100. This will help tech support in answering your questions. (The same information is requested on the Warranty Registration Card.)

Model No.: _____
Serial No.: _____
Software Version: _____

The model and serial numbers are on the bottom of your RouteFinder100.

Please note the type of external link device that is connected to your RouteFinder100 before calling tech support. Also, note the status of your RouteFinder100 including LED indicators, screen messages, diagnostic test results, problems with a specific application, etc. Use the space below to note the RouteFinder100 status:

_____
_____
_____
_____
_____
_____

For additional status information, refer to the "Router Version" and Router Status" in section 5.2.5 of this manual.

10.4 Service

If your tech support specialist decides that service is required, your RouteFinder[100] may be sent (freight prepaid) to our factory. Return shipping charges will be paid by Multi-Tech Systems.

Include the following with your RouteFinder[100]:

- a description of the problem.
- return billing and return shipping addresses.
- contact name and phone number.
- check or purchase order number for payment if the RouteFinder[100] is out of warranty. (Check with your technical support specialist for the standard repair charge for your RouteFinder[100]).
- if possible, note the name of the technical support specialist with whom you spoke.

If you need to inquire about the status of the returned product, be prepared to provide the **serial number** of the product sent (see Section 10.3.1).

Send RouteFinders to this address:

MULTI-TECH SYSTEMS, INC.
2205 WOODALE DRIVE
MOUNDS VIEW, MINNESOTA 55112
ATTN: SERVICE OR REPAIRS

You should also check with the supplier of your RouteFinder[100] on the availability of local service and/or loaner units in your part of the country.

10.5 The Multi-Tech BBS

For customers who do not have Internet access, Multi-Tech maintains a bulletin board system (BBS) that mirrors its FTP site. Information available from the BBS includes new product information, product upgrade files, and problem-solving tips. The phone number for the Multi-Tech BBS is (800) 392-2432 (USA and Canada) or (612) 785-3702 (international and local).

The BBS can be accessed by any asynchronous modem operating at 1200 bps to 33,600 bps at a setting of 8 bits, no parity, and 1 stop bit (8-N-1).

10.5.1 To log on to the Multi-Tech BBS

1. Set your communications program to **8-N-1**.
2. Dial our BBS at (800) 392-2432 (USA and Canada) or (612) 785-3702 (international and local).
3. At the prompts, type your first name, last name, and password; then press ENTER. If you are a first time caller, the BBS asks if your name is spelled correctly. If you answer yes, a questionnaire appears. You must complete the questionnaire to use the BBS on your first call.
4. Press ENTER until the Main Menu appears. From the Main Menu you have access to two areas: the Files Menu and News. For help on menu commands, type **?**.

10.5.2 To Download a file

If you know the file name

1. From the Main Menu, type **F** to access the Files Menu, then type **D**.
2. Enter the name of the file you wish to download from the BBS.
3. If a password is required, enter the password.
4. Answer **Y** or **N** to the automatic logoff question.
5. Select a file transfer protocol by typing the indicated letter, such as **Z** for Zmodem (the recommended protocol).

6. If you select Zmodem, the transfer will begin automatically. If you select another protocol, you may have to initiate the transfer yourself. (In most datacomm programs, the PAGE DOWN key initiates the download.)
7. When the download is complete, press ENTER to return to the File Menu.
8. To exit the BBS, type **G** and press ENTER.

If you don't know the file name

1. From the Main Menu, type **F** to access the Files Menu. For a list of file areas, type **L**, press ENTER, then type **L** and press ENTER again. (If you do not type the second *L*, you will list all of the files on the BBS.)
2. Mark each file area you would like to examine by typing its list number and pressing ENTER.
3. Enter **L** to list all the files in the selected file areas. Enter **C** to go forward in the file list and **P** to go back.
4. To mark one or more files for download, type **M**, press ENTER, type the list numbers of the files, and press ENTER again.
5. Enter **D**. You will see a list of the files you have marked. Enter **E** if you would like to edit the list; otherwise enter **D** again to start the download process.
6. Select a file transfer protocol by typing the indicated letter, such as **Z** for Zmodem (the recommended protocol).
7. If you select Zmodem, the file will transfer automatically. If you select another protocol, you may have to initiate the transfer yourself. (In most data communications programs, the PAGE DOWN key initiates the download.)
8. When the download is complete, press ENTER to return to the File Menu.
9. To exit the BBS, type **G** and press ENTER.

10.6 About CompuServe

In addition to the BBS, Multi-Tech provides support through CompuServe's Modem Vendor Forum (GO MODEMVEN). Refer to your Compuserve documentation for special operating procedures.

10.7 About the Internet

Multi-Tech is a commercial user on the Internet, and we retreive messages from our customers on a periodic basis. If you prefer to receive technical support via the Internet, go to the following address:

http://www.multitech.com/_forms/email_tech_support.htm

Multi-Tech's presence includes a Web site at:

http://www.multitech.com

and an ftp site at:

ftp://ftp.multitech.com

10.8 About the Multi-Tech Fax-Back Service

Multi-Tech's fax-back system provides 24-hour access to sales, marketing, and technical literature. Dial 612-717-5888, follow the voice prompts, and request document number 10 for a catalog of available documents. For convenence, have your fax number handy: _____.

From the catalog of available documents, you can order newsletters, white papers, press releases, etc. from the sales and marketing index (pages 1-4), or order basic modem operation and troubleshooting guides from the technical support and engineering index. Just enter the applicable FB Doc. # from the left column of the catalog.

RouteFinder 100™

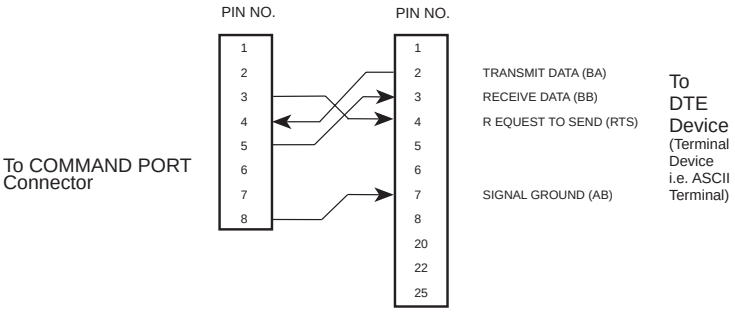
Single WAN Multi-Protocol Router

Appendixes

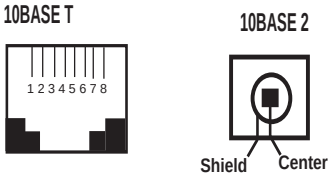
MultiTech® Systems

Appendix A - Cabling Diagrams

Command Port Cable



LAN Cables



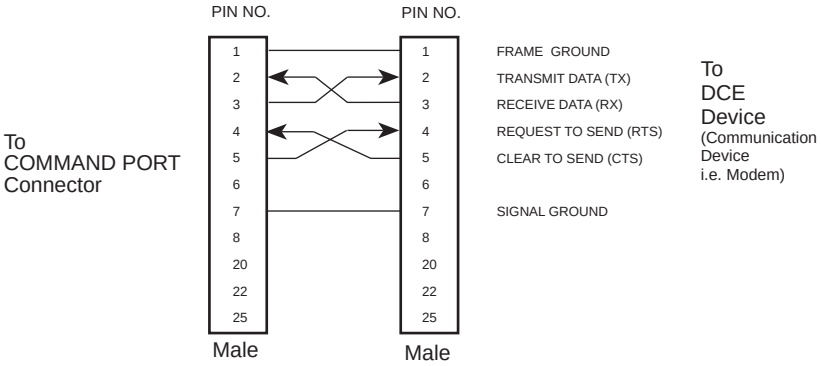
10BASE-T (RJ-45)

Pin	Circuit	Signal Name
1	TD+	Data Transmit Positive
2	TD-	Data Transmit Negative
3	RD+	Data Receive Positive
6	RD-	Data Receive Negative

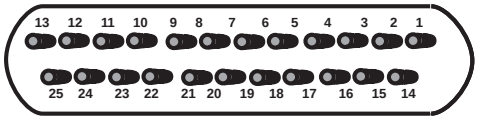
10BASE 2 (BNC)

Pin	Description
1	Center
2	Shield

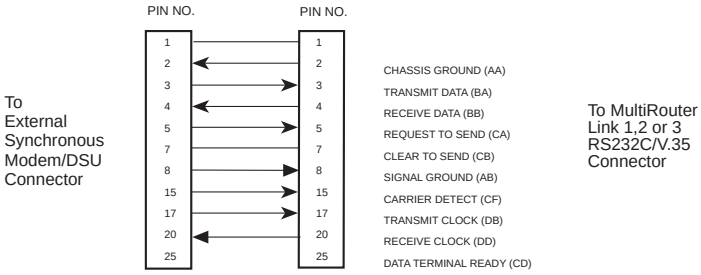
Remote Configuration Cable



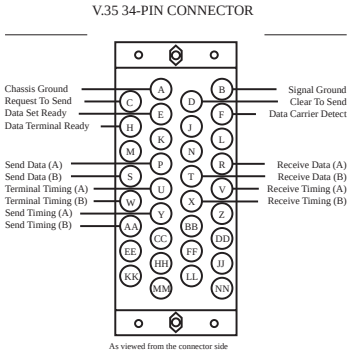
Link Cables

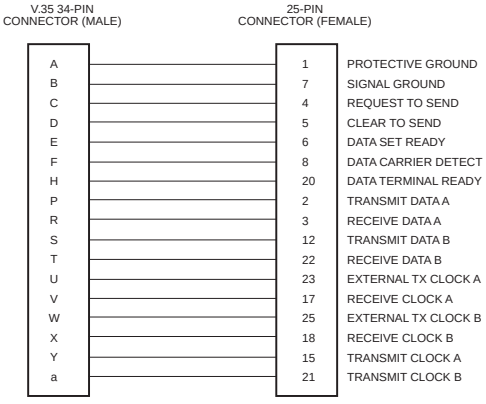


RS232C/V.24 * Link Cable


PIN NO.
PIN NO.
To External Synchronous Modem/DSU Connector
1 2 3 4 5 7 8 15 17 20 25
1 2 3 4 5 7 8 15 17 20 25
CHASSIS GROUND (AA)
TRANSMIT DATA (BA)
RECEIVE DATA (BB)
REQUEST TO SEND (CA)
CLEAR TO SEND (CB)
SIGNAL GROUND (AB)
CARRIER DETECT (CF)
TRANSMIT CLOCK (DB)
RECEIVE CLOCK (DD)
DATA TERMINAL READY (CD)
To MultiRouter Link 1,2 or 3 RS232C/V.35 Connector

V.35 Adapter Cable Configured on a RS232C/V.35** Link Cable




V.35 34-PIN CONNECTOR (MALE)
25-PIN CONNECTOR (FEMALE)
A B C D E F H P R S T U V W X Y a
1 7 4 5 6 8 20 2 3 12 22 23 17 25 18 15 21
PROTECTIVE GROUND
SIGNAL GROUND
REQUEST TO SEND
CLEAR TO SEND
DATA SET READY
DATA CARRIER DETECT
DATA TERMINAL READY
TRANSMIT DATA A
RECEIVE DATA A
TRANSMIT DATA B
RECEIVE DATA B
EXTERNAL TX CLOCK A
RECEIVE CLOCK A
EXTERNAL TX CLOCK B
RECEIVE CLOCK B
TRANSMIT CLOCK A
TRANSMIT CLOCK B

* The MultiRouter RS232C interface circuits have been designed to meet the electrical specificaitons given in EIA (Electronic Industries Association) RS232C and CCITT (Consultative Committee International Telegraph and Telephone) V.24 Standards.

** When configured for V.35 interface operation on the link, the V.35 adapter cable should be used. This cable uses a 25-pin female connector at one end and a 34-pin winchester male connector at the other end.

Appendix B - Script Language

The script file can be used to antomate certain operation. The script file is a text file containing a sequence of commands. The structure of a script file in succinctly expressed by the following grammar.

Script Language Grammar

```
<program>          =<declarations> <proc_declarations>
<declarations>     ={<var_type> <identifier> {,<indentifier> } ; }
<var_type>         =INTEGER I STRING
<statement_list>   ={<statement>}
<statement>        =<elementary_statement> I <if_statement> I
                     <for_statement> I <while_statement> I
                     <switch_statement>
<if_statement>     =IF <expression> THEN
                         <statement_list> {
                    ELSE
                         <statement_list> }
                    ENDIF
<for_statement>    =FOR <indentifier>=<expression> TO          IDOWNTO
                    <expression} STEP <expression> / DO
                    <statement_list>
                    ENDFOR
<while_statement>           =WHILE <expression> DO
                             <statement_list>
                    ENDWHILE
<switch_statement>  =SWITCH <expression> {
                       CASE <integer_const> <statement_list> I
                       CASE <string_const> <statement_list> I
                       DEFAULT <statement_list> }
                       ENDSWITCH
<elementary_statement>  =<identifier> = <expression> ; I
          <identifier> / (<expression> {,<expression> } ) /; I
          GOTO <identifier> ; I <identifier> : I ;
<expression>         =<expression> OPERATOR <expression> I
                      {<expression> } I /<expression>I-<expression> I
                      <identifier> / (<expression> {, <expression> } ) /
OPERATOR       = < I <= I > I >= I == I != I && I II I + I - I * I / I !
<proc_declaration>          =PROC <identifier>/(<parameter_list>)}
                            { :<vartype> };
                            FORWARD ;
<proc_declaration>          =PROC <identifier>/(<parameter_list>)}
                            / : <vartype> / ;
                            <declarations> <statement_list>
                            ENDPROC
<parameter_list> =<argument_list> { ; <argument_list>}
<argument_list>  ={VAR} <var_type> <identifier> {<identifier>}
```

Execution starts at the PROC main. PROC main cannot have any arguments. All the variables have to be declared before use. All procedures must be declared before calling. Recursion is allowed in procedures.

To define mutually recursive procedures, use the FORWARD directive to indicate that the procedure body is defined later in the source file. Procedures defined with the FORWARD directive should have all the parameters and return value (if any) specified, the actual definition of the procedure body should not contain the formal parameter list or the return value. An example of forward defined procedures is given below:

```
proc a(integer x,y) : integer,forward:

proc b(integer u,v) : integer,forward:
```

Script Language Grammar

```
proc a;
        integer t;
        /*Some more code here. */

        t=b(x,y);
        /*Some more code here. */
        return(t);
endproc

proc b;
        return(a(u,v);
endproc
```

Argument to procedures can be passed by value or address. To pass an argument by address, prefix the argument name in the formal parameter list by the keyword VAR; otherwise the argument is passed by value. Only variables can be passed by address. Expressions like A+B, where A and B are integer variables can be passed by value but cannot be passed by address.

Two basic types of variables are supported: INTEGER and STRING

In the STRING, since the ASCII null character is internally used to indicate the end of the sequence, it cannot be part of the string. All other characters, including extended ASCII characters can be part of the string.

There are two types of conditional constructs: IF and SWITCH

The IF statement is a two-way branching construct. The condition can be an arbitrary expression. The condition in the IF statement should evaluate to an integer or real. If the expression in the IF statement evaluates to non-zero, the control enters the THEN statement, otherwise control enters the ELSE statement.

The SWITCH statement is a multi-way branching construct. The type of conditional expression should be either INTEGER or STRING. The value of the conditional expression is matched against the constrants given in the CASE options, if the value matches a CASE option value, control enters that CASE option. If the values do not match any of the CASE options, and if a DEFAULT option is provided, control continues at the DEFAULT option; otherwise control continues at the statement after the ENDSWITCH. If control enters one of the CASE or DEFAULT statements, all the statements up to the next ENDCASE statement are executed. Each CASE or DEFAULT statement should be terminated by a matching ENDCASE keyword. The SWITCH statement should be terminated by a ENDSWITCH keywork. The DEFAULT statement can be placed anywhere within the scope of the SWITCH statement. There can be only one DEFAULT statement.

There are two types of iterative contructs: FOR and WHILE

The FOR construct sets the loop control variable to an initial value. The control variable is checked for bounds, and if within bounds, the <statement_list> given is executed; otherwise the loop execution terminates. After each execution of <statement_list>, the control variable is incremented or decremented by a certain value. This is computed as follows: if the STEP expression is given it is the value of the expression, else it is 1. The control variable is incremented if TO is specified, and is decremented if DOWNTO is specified. After updating the control variable the bounds check is done again. The keyword ENDFOR is mandatory at the end of the loop.

The WHILE loop has an expression and a <statement_list>. The expression is evaluated and if the expression is non-zero the <statment_list> is executed; otherwise the loop execution terminates. The keyword ENDWHILE is mandatory at the end of the loop.

Operator Precedence:

Operators are listed in the order of precedence

Unary Operators :-!(unary minus, logical negation)

Binary Operators :*/ **+ _< > <= >= == ! = &&** II

All the operators are left associative. Expressions are evaluated completely; so care must be taken while writing expressions. For example, expressions like (a !=0 && b / a) would create run time error.

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